

## **Explanation of Purpose**

### **Leavenworth National Fish Hatchery – Comprehensive Hatchery Management Plan**

This Comprehensive Hatchery Management Plan (CHMP) for Leavenworth National Fish Hatchery (NFH) is an operational management plan which outlines policy, legal mandates, goals and objectives relevant to the overall management of the station. This document is a planning and reference tool and is not a decision-making or policy-making document.

Additional documents developed as separate processes are referenced in this CHMP and provide biological, policy, legal, and management analysis of Leavenworth NFH. These documents are the Biological Assessment and Biological Opinion on Artificial Production in the Columbia River Basin, the Federal Columbia River Power System Biological Opinion, the Hatchery and Genetic Management Plan, and the U.S. v Oregon Columbia River Fisheries Management Plan.

The correct citation for this plan is:

U.S. Fish and Wildlife Service (USFWS). 2004. Comprehensive Hatchery Management Plan for the Leavenworth National Fish Hatchery. Planning Report Number 2, U.S. Fish and Wildlife Service, Leavenworth National Fish Hatchery, Leavenworth, Washington.

This Comprehensive Hatchery Management Plan for Leavenworth National Fish Hatchery (Planning Report: Number ?) addresses the Pacific Region’s requirement to integrate U.S. Fish and Wildlife Service objectives and priorities with those of co-managers, other agencies, and resource programs; fulfill obligations under the Endangered Species Act and relevant fisheries conservation, mitigation, and management programs; identify and define, in specifics, what hatchery reforms are implemented to achieve objectives; and, provide a foundation for future program and budget development and review.

Submitted by: \_\_\_\_\_  
Project Leader, Leavenworth NFH \_\_\_\_\_  
Date \_\_\_\_\_

\_\_\_\_\_  
Project Leader, Mid-Columbia River FRO \_\_\_\_\_  
Date \_\_\_\_\_

\_\_\_\_\_  
Project Leader, Olympia Fish Health Center \_\_\_\_\_  
Date \_\_\_\_\_

Approved: \_\_\_\_\_  
Assistant Regional Director, Fisheries \_\_\_\_\_  
Date \_\_\_\_\_

Approved: \_\_\_\_\_  
Regional Director, Pacific Region \_\_\_\_\_  
Date \_\_\_\_\_

## **Acknowledgments**

Dan Diggs and Doug DeHart coordinated the initial development of this plan, along with Chuck Dunn, Lee Hillwig, Ed Forner, Kate Benkert, Bob Semple, Larry Marchant, Ed Lamotte, Bob Wunderlich, Ron Wong, Ray Jones, Thomas Trock, Brian Cates, and Rich Johnson.

## **List of Attachments**

- Attachment 1. Map of USFWS Pacific Region (Region 1), Fish Facilities.
- Attachment 2. Historical Background of Region 1 Hatcheries.
- Attachment 3. Statutory Mandates and Authorities.
- Attachment 4. Map of Wenatchee River Watershed, Land Ownership.
- Attachment 5. Hatchery Buildings, Primary Use and Improvements.
- Attachment 6. Leavenworth NFH Physical Description of Holding, Incubation, and Rearing Units.
- Attachment 7. Layout Diagram of Leavenworth NFH.
- Attachment 8. Map of Wenatchee River Basin, Fish Structures and Facilities.
- Attachment 9. Listed and Candidate Species in Vicinity of Leavenworth NFH.
- Attachment 10. Fish Species Present in the Wenatchee River Basin.
- Attachment 11. Historical Fish Releases from Leavenworth NFH, 1941-2003.
- Attachment 12. USFWS/WDFW Fish Health Guidance Letter (5/1/02).
- Attachment 13. Brood Year Survival/History, 1979-1998.
- Attachment 14. Coded-Wire Tag Recoveries, 1999-2001. Contribution to Fisheries, 1991-2000.
- Attachment 15. Current Budget and number of personnel.
- Attachment 16. Regional and National Budget Formulation.
- Attachment 17. Guidance from Regional Director for distribution of surplus fish.
- Attachment 18. Memo from RD concerning use of anesthetics, etc.
- Attachment 19. Integrated Pest Management Plan.

## **Executive Summary**

### **Plan Overview**

The U.S. Fish and Wildlife Service (Service) has recognized the need for a comprehensive hatchery planning process to assist in meeting the challenge of changes to hatchery management as required by the conservation status of most Pacific salmon and other anadromous and freshwater fish species. The development of plans, such as this one, will help to: 1) integrate Service objectives and priorities with those of co-managers, other agencies, and resource programs; 2) fulfill our obligations under the Endangered Species Act (ESA) and relevant fisheries conservation, mitigation, and management programs; 3) identify and define in specifics what hatchery reforms we are implementing to achieve our objectives; and 4) provide a foundation for future program and budget development and review. This plan recognizes and complies with all management plans and Biological Opinions affecting the Columbia River Basin in general, and the Wenatchee River Basin in particular.

### **Hatchery Purpose**

Leavenworth National Fish Hatchery was authorized by the Grand Coulee Fish Maintenance Project, April 3, 1937 and reauthorized by the Mitchell Act (52 Stat. 345), May 11, 1938 to compensate for fish losses caused by the construction of Grand Coulee Dam. Original production consisted of Chinook salmon trapped at Rock Island Dam, but since then has included several resident and anadromous salmonids. The hatchery is currently used for adult collection, egg incubation and rearing of spring Chinook salmon. It also provides juveniles and/or adults for re-establishing spring Chinook runs in other Columbia River tributaries, as needed.

The following Hatchery Management Goals were adapted from the Mitchell Act, Endangered Species Act (ESA) Biological Opinions, U.S. v. Oregon agreements, and the Integrated Hatchery Operations Team – Operation Plans for Anadromous Fish Production Facilities in the Columbia River Basin, Volume III – Washington, Annual Report for 1995 (IHOT 1996).

### **Hatchery Goals<sup>1</sup>**

- Goal 1: Produce fish species and numbers commensurate with those lost/affected by the construction of Grand Coulee Dam. Assure that hatchery operations support Columbia River Fish Management Plan (U.S. v. Oregon) production and harvest objectives.
- Goal 2: Minimize impacts to ESA listed and other native species, their habitat, and the environment.
- Goal 3: Provide the public with quality aquatic interpretation and education, customer service and comprehensive outreach to enhance public understanding, participation and support of Service and Leavenworth NFH programs.

---

<sup>1</sup> Objectives, tasks, and current practices to achieve goals are described in Chapter 3.

## **Hatchery Benefits**

**Harvest Contribution:** Spring Chinook salmon from Leavenworth NFH have, over the years, supported successful sport and tribal fisheries in the Wenatchee River and Icicle Creek, and to a lesser extent, the Columbia River and ocean (refer to Chapter 3 for more discussion on harvest). For example, in 2002, the sport catch in Icicle Creek was 1,202, with a tribal harvest of 3,793 and 6,458 adults returned to the hatchery (WDFW 2002).

**Economic Benefit:** During times of good ocean and river conditions that result in healthy adult returns, significant economic activity is generated through harvest of Leavenworth NFH spring Chinook salmon. For example in 2003, Washington Department of Fish and Wildlife estimated that 4,016 anglers fished a total of 29,133 hours during the Icicle Creek fishery (WDFW 2003).

In addition, the role of a Federal mitigation hatchery is to compensate for natural habitat lost to Federal hydro-power projects. It follows then, that the economic benefit of the mitigation hatchery is interwoven into the economic benefit of the hydro-power project/s being mitigated for and that the hatchery can be characterized as an operating expense of the hydro-power project. The Service recognizes that mitigation hatcheries serve a significant role in supporting economically important fisheries.

## **Planning Issues**

Several federal, state, and tribal entities share responsibilities for development of sub-basin plans, hatchery production, harvest management, and ESA considerations. The CHMP recognizes and complies with all management plans and Biological Opinions affecting the Columbia River Basin, in general, and the Wenatchee River Basin in particular. Operations at Leavenworth NFH pose a number of potential issues in the watershed.

### **Marking:**

- To help protect wild and naturally produced fish, the states of Washington, Oregon and Idaho are implementing selective sport and commercial fisheries (non-tribal) on marked hatchery fish.
- Columbia River Treaty Tribes generally disagree with the management strategy for mass marking and selective fisheries.
- The Service has not made any unilateral decisions on marking (although all juveniles released from Leavenworth NFH are externally marked).

### **Juvenile salmon distribution and production numbers:**

- Juvenile salmon are released from the hatchery in the spring as yearling smolts to promote quick downstream migration from the hatchery.

- The Yakama Nation has expressed an opinion that juvenile fish from the hatchery should be released throughout the watershed.

**Water shortage (drought):**

- During drought conditions the hatchery may need to make early releases of juvenile spring Chinook into Icicle Creek (although this has yet to happen).
- Conservation groups are highly concerned about potential actions undertaken by the hatchery to address drought conditions and their impact to listed salmonids.

**Surplus adult salmon distribution:**

- The Service, Yakama Nation, other agencies and conservation groups, would like to see plans developed to determine the number of salmon carcasses, if any, is suitable for stream enrichment, both dead and alive.

**Fish passage and ladder management:**

- Conservation groups are concerned about the current lack of fish passage to areas above the hatchery's barrier dam. A major project is currently underway to provide fish passage by 2006.
- The Service is concerned about potential disease risks from allowing adult salmon to spawn and die in areas above the hatchery water intake.

## **CHAPTER 1: INTRODUCTION/BACKGROUND**

### **1.1 Purpose of and Need for Plan**

Construction of Leavenworth National Fish Hatchery started in 1938, with the first release of Chinook salmon occurring in 1942. The intent of this facility is to mitigate for lost salmonid production due to the construction of Grand Coulee Dam. Over the years, the LNFH production program has included a variety of species including spring and summer Chinook, coho, steelhead, kokanee, sockeye, and various resident salmonids. Since 1974, spring Chinook salmon have been the priority species and the success of the program has allowed a sport and tribal fishery in most years. In the past, hatchery programs were allowed to evolve based on perceived needs and the capabilities of the facility. Today's hatchery programs are still dynamic and the origin of change is driven by public appeal, legislative mandates, judicial decrees, and the ESA. The need to develop thoughtful planning processes based on sound policy and scientific information has never been greater.

The U. S. Fish and Wildlife Service has recognized the need for a comprehensive hatchery planning process to assist in meeting the challenge of changes to hatchery management required by the conservation status of most Pacific salmon and other anadromous and freshwater fish species. The development of plans, such as this one, will help to: 1) integrate Service objectives and priorities with those of co-managers, other agencies, and resource programs; 2) fulfill our obligations under the Endangered Species Act and relevant fisheries conservation, mitigation, and management programs; 3) identify and define in specifics, what hatchery reforms we are implementing to achieve our objectives; and 4) provide a foundation for future program and budget development and review.

The Service is committed to developing and maintaining a sound scientific and management underpinning for its programs. The Service has participated with State, Tribal and Federal partners in reviewing and assessing hatchery operations as they evolve to become, more than ever, part of the solution to fisheries restoration and recovery goals. The Service has involved our cooperators in defining and evaluating our respective goals, and the Service continues to reach out to the general public, individual constituent groups and local governments to explain our programs and initiatives. The Service has put in place, a system of program evaluation that utilizes principles of adaptive management to integrate new information and expectations. All this and more are embodied in the development of this plan. The journey of developing these plans, the research, analysis, thought, outreach, is as important as the product itself. The Service looks into this process to stabilize and strengthen Service fish production programs in fisheries restoration and recovery efforts of the Nation.

### **1.2 Description of Planning Process**

The planning process began in spring 2003 with the establishment of the Leavenworth CHMP Team, the core group responsible for drafting and revising the CHMP as it moves towards its anticipated completion in spring 2006. The team is composed of Service staff



directly involved with the hatchery program. Additional coordination was provided by members from the Regional CHMP Steering Committee. The Steering Committee, composed of Service representatives from the Pacific Region, provided oversight to the CHMP process. In addition, the Steering Committee developed the general format and time-line for completing the CHMP process.

### **1.3 Composition of Planning Team**

The planning team was made up of Service representatives from the following offices:

Leavenworth National Fish Hatchery  
12790 Fish Hatchery Road  
Leavenworth, WA 98826  
Julie Collins, Plan co-lead  
Dan Davies  
Corky Broaddus

Mid-Columbia River Fishery Resource Office  
7501 Icicle Road  
Leavenworth, WA 98826  
David Carie, Plan co-lead  
Brian Cates

Olympia Fish Health Center  
3704 Griffin Lane S.E.  
Suite 101  
Olympia, WA 98501  
Ray Brunson  
Dr. Joy Evered

### **1.4 Review and Update of Plan**

Because the biological, sociological, economic, and political environment is constantly changing, the roles and responsibilities of Leavenworth NFH can also be expected to change. It was the intent from the beginning that the CHMP would itself be dynamic to reflect that nature. Therefore, it was necessary to include a process for reviewing and updating the plan on a periodic basis. Review and updating will take place at least once every five years and will be the responsibility of the Hatchery Evaluation Team (HET).

### **1.5 Fisheries Program Mission, Goals, and Priorities**

Our National Fish Hatcheries have authority for construction, operation, and maintenance that is contained in a variety of specific and general statutes. The remainder of the Fisheries Program is guided by a variety of general statutory mandates and authorities. Without the specific direction that would come from organic legislation, the Service has continually adjusted the priorities of the entire Fisheries Program, at the national level, to

guide the program and ensure that each Region within the Service is focusing their limited resources on the highest priorities of the Nation (Attachment 1: Map of USFWS Pacific Region).

To provide long-term management direction for fishery resources, the Service in January 1985, issued its most complete description of priorities to date for the Fisheries Program in a document entitled, “Statement of Responsibilities & Roles” (USFWS Fishery Resources Program, January 31, 1985). In May 1994, to incorporate those priorities within an ecosystem approach, the Service combined the fisheries resources and aquatic priorities of the Fisheries, Ecological Services and Refuge Programs into a single document titled, “Action Plan for Fishery Resource and Aquatic Ecosystems”. This document included a comprehensive ecosystem and watershed based conservation, restoration, and enhancement program. As the Fisheries Program further evolved to include a conservation perspective to the management of natural populations, a revision to the Fisheries Program priorities was announced in November 1997. The Director approved and announced the following six priorities for the Service’s Fishery Program:

- Recovery of listed and candidate aquatic species
- Restoration of interjurisdictional fisheries and aquatic ecosystems
- Management of interjurisdictional fisheries
- Fulfilling mitigation obligations
- Restoring depleted aquatic populations to preclude listing
- Providing fish and wildlife management assistance to tribes and on Service land

Across the Nation, the Fisheries Program continues to be guided by these priorities, but there is an ongoing effort that, when completed, may revise these priorities. At the request of Congress and the Office of Management and Budget, the Service began development of a strategic plan for the National Fish Hatchery System in 2000. In 2001, the Service then began preparation of a strategic plan for the entire Fisheries Program. When completed, these documents will set the new direction for the Fisheries Program and the role of National Fish Hatcheries in implementing program priorities.

## **1.6 National Fish Hatchery System, National/Regional Overview and Statutory Mandates/Authorities**

The Service’s stewardship of the Nation’s varied and valuable fishery resources dates from the appointment of Spencer Baird as Commissioner of Fish and Fisheries by President Ulysses S. Grant in 1871. That initial Federal involvement was in response to concern over the widespread decline in domestic food fish supplies. In 1872, Congress provided the first appropriation for the Fishery Program when it funded the introduction of shad, salmon, whitefish, and other food fishes into waters to which they were best adapted. A little later that year, “The propriety was strongly urged, at the Boston meeting, of sending some experienced fish-culturist to the west coast for the purpose of securing a large amount of spawn of the California salmon.” Mr. Livingston Stone traveled to California and established a hatching-works on the McCloud River. This was

the first salmon breeding unit in the United States, the first hatchery to be established with federal funds, and the beginning of the National Fish Hatchery System.

During the early years of the hatchery program, most National Fish Hatcheries were established under general authorizations for fisheries development as specified in appropriation acts. In the 1930's, a series of acts provided authorizations for hatchery development. This permitted the National Fish Hatchery System to expand on a planned basis.

The Service has a 130-year history of leading Federal fishery conservation efforts in the Pacific Northwest. During this time, our Federal fishery resource involvement and responsibilities have grown, diversified, and undergone several modifications in response to continually changing needs. The program shifts and expansions evolved to address the circumstances of each era. Today, the Service is taking a holistic approach to fishery conservation. Present activities focus on a broad array of scientific fishery management and conservation efforts.

A historical background into the establishment and operation of National Fish Hatcheries in Region 1 is provided in Attachment 2 (Note: Region 1 is the Pacific Region and includes Washington, Oregon, Idaho, California, Nevada, Hawaii and the Pacific Territories). Since the establishment of the first salmon hatchery on the McCloud River, 67 hatcheries or fish facilities have been established in California, Idaho, Oregon, and Washington. Only 19 of those hatcheries, two fish facilities, and one technology center are in operation today. The remainder have either been closed or transferred to State or other Federal agencies.

The development of a broad range of statutory mandates and authorities under which the Service conducts its hatchery program, along with numerous other fishery related activities conducted in cooperation with other Federal, State, Tribal, and private entities is documented in Attachment 3. Vested with significant legal responsibilities under State and international agreements, treaties and laws, the Service conducts an extensive conservation effort in order to help protect and restore native aquatic species and their habitats with the goal of preempting severe declines and potential listings under the ESA.

The Region 1 Fisheries Program consists of four major program activities: National Fish Hatcheries, Fish Health Centers, the Abernathy Fish Technology Center, and Fishery Resource Offices/Fish and Wildlife Offices. Successful implementation of the Service's hatchery activities requires close coordination and cooperation with the other three Fisheries Program activities. The Abernathy Salmon Technology Center provides state-of-the-art applied research in several fields including development of new fish diets for salmonid and sturgeon culture, use of genetic identification in the recovery and restoration of native stocks, and development of new and improved techniques to increase the efficiency of fish culture and captive brood stock operations. Fish Health Centers participate in Investigational New Animal Drug (INAD) registration to provide diagnostic and veterinarian services on wild fish stocks and hatchery-reared fish, and supply health certifications for the export of fish and eggs. Fishery Resource

Offices/Fish and Wildlife Offices participate in a wide variety of activities including coast-wide stock assessment and evaluation, coded-wire tagging of hatchery indicator stocks for the U.S./Canada Treaty, evaluation of hatchery production, and assessments of new approaches to produce “wild type” fish at culture facilities. These offices also participate in a broad range of other activities including habitat assessment and restoration, non-indigenous species coordination, natural production studies, harvest assessment, fish passage coordination, and endangered species listing and recovery activities.

## **1.7 Regional Fishery Goals and Priorities**

The Pacific Region Fisheries Program is committed to focusing its priorities and resources toward the conservation, recovery, and restoration of native resident and interjurisdictional species. The Fisheries Program works with State, Federal, Tribal and other partners, as well as on Service, Tribal, and other Federal lands, to ensure that its actions purposefully contribute to these objectives. Regional priorities are as follows:

**Implementing Hatchery Reform** – National Fish Hatcheries are reforming hatchery practices to conform to their associated scientific foundations and management evaluations of those efforts. National Fish Hatcheries in the Pacific Region produce and release fish, and stocks of fish, as identified in approved Hatchery Genetic Management Plans (HGMP’s).

**Implementing Comprehensive Hatchery Management Plans (CHMP’s)** – Implementation of the CHMP is a highly significant Regional priority. Comprehensive plans incorporate the rational, authorities and supportive documentation for operation and management of National Fish Hatchery programs.

**Hatchery Evaluations** – Monitoring and evaluation of hatchery production programs are a critical component of effective hatchery operations. Completion of hatchery management plans, including this one, will further identify research needs and assure quality.

**Hatchery Evaluation Teams (HET)** – To foster and enhance communication in the hatchery production and evaluation process, active participation in HET’s by Service programs, resource agencies, and public partners is a Fisheries Program priority.

**Habitat Restoration and Technical Assistance to Other Regional Programs** – Providing technical assistance to other Regional programs on Service lands with Partners for Fish and Wildlife and other Service habitat restoration efforts is a high priority of the Fisheries Program.

**Tribal and Federal Lands** – Providing support to Tribal Governments and Federal land management agencies for fish and wildlife resources on their lands has always been and continues to be a high priority.

**Fish Passage Improvements** – An important part of the Fisheries Program is habitat restoration, which re-establishes access to important historic habitats for fish. As such, emphasis is placed on fish passage improvement. A high priority is given to identifying and correcting fish passage problems at NFH's, other Service and non-Service lands.

**Endangered Species Act (ESA)** – The Fisheries Program promotes and initiates actions that ensure all Fisheries Stations in the Pacific Region are in compliance with the ESA.

**Compliance with Court Agreements and Other Legal Obligations** – The Fisheries Program complies with court agreements and other legal obligations and enhancement efforts that contribute to the mitigation, conservation, restoration, and recovery of listed, candidate and imperiled fish species, both anadromous native fish and resident native fish, such as bull trout, cutthroat trout, desert fishes, and others.

**Mitigation** – The Fisheries Program implements artificial production to comply with mitigation responsibilities consistent with Congressional mandates and funding.

**Restoration and Recovery of Native Fishes** – Restoration and recovery of native fishes is a Regional priority. Healthy stocks of native fish are indicators of clean water and healthy aquatic ecosystems. Healthy stocks of native fish also provide harvest opportunities for recreational, commercial, and tribal fishers.

**Ecosystem and Cross-program Approach** – The Fisheries Program continues to work within an ecosystem and cross-program approach, using the collective expertise of our employees and Programs in coordinated fashion.

**Make Full Use of Computer and Database Technology** – It is an ongoing Regional priority to strengthen our staff capabilities and make full use of computer and database technology in order to increase program effectiveness and efficiency, and meet the needs of resource management agencies, tribes, and other Federal agencies.

**Outreach** – Educational and outreach opportunities are pursued to enhance public understanding of program responsibilities, capabilities, and accomplishments, and will continue to be an important component of the Fisheries Program.

**Compliance with the National Historic Preservation Act (NHPA, 1966 as amended)**  
Section 110 of the NHPA requires Federal agencies to, among other things, nominate eligible properties to the National Register of Historic Places and conduct agency programs and activities so that preservation values are considered. The Leavenworth NFH station was nominated to the National Register and listed in 1998. Therefore, a goal of this management plan is to preserve the historic qualities of the hatchery buildings. Buildings and structures that contribute to the hatchery's historic significance are: the hatchery, shop and cold storage buildings; residences; Foster-Lucas ponds; the canal; bridge; spillway; headgate; screen chamber; Snow Lake Tunnel, and Well #1.

## **1.8 Legal and Policy Guidance**

National Fish Hatchery programs in the Columbia River Basin are shaped by various policies, regulations, laws, agreements and legislative mandates. NFH managers and policy makers are constantly challenged with the complex task of implementing a comprehensive state-of-the-art hatchery program while complying with legal, regulatory, and legislative mandates which have different and sometimes conflicting purposes. For example, the Mitchell Act and subsequent amendments, ESA and subsequent Biological Opinions, Treaty of 1855 with Columbia River Tribes, U.S. v Oregon court order of 1969 and the subsequent Columbia River Fish Management Plan, all guide production in the Columbia River. Chapters 2, 3 and 4, further discuss legal justification and operational guidance for Leavenworth NFH.

## **CHAPTER 2. HATCHERY AND RESOURCE DESCRIPTIONS**

### **2.1 Hatchery Overview**

Leavenworth NFH is situated on Icicle Creek near the town of Leavenworth in Chelan County, Washington. Icicle Creek flows into the Wenatchee River, tributary to the Columbia River. Fish released from and adults returning to Leavenworth NFH must travel about 496 miles (2.8 miles, Icicle Creek; 25.6 miles, Wenatchee River; and 468 miles Columbia River), and must negotiate passage through seven Columbia River hydroelectric dams. The hatchery sits on 160 acres of fill within the Wenatchee River floodplain. Icicle Creek is a 31.8 mile long, fourth order tributary, and drains a 211 square mile basin containing 85 tributaries, 14 glaciers and 102 lakes. The glaciers within the basin have the highest mean altitude (8,227 feet) of any glaciers in the North Cascades. Elevation of the basin ranges from 1,102 feet at the confluence with the Wenatchee River (hatchery is approximately 1,200 feet), to the 9,470 foot summit of Mt. Stuart, about 12.5 miles southwest of the hatchery. The USFS manages 87% of the Icicle Creek subbasin, of which 74% is within the Alpine Lakes Wilderness Area and is managed as a Tier 1 key watershed under the Northwest Forest Plan (USFS 1994). Therefore, public lands in the Icicle Creek drainage are managed for at-risk salmonids and other fish species (Attachment 4).

Currently, Leavenworth NFH operates with a staff of 15. This includes the hatchery manager, fish biologist, receptionist, purchasing agent, information and education specialists, animal caretakers, and maintenance personnel. In addition, the hatchery is the administrative headquarters of the Leavenworth NFH Complex. Leavenworth Complex staff consists of the administrative and outreach functions. With Complex staff, the total number of employees located at LNFH is 20.

### **2.2 Hatchery Purpose**

Leavenworth NFH was built to mitigate for lost anadromous fish production due to the construction of Grand Coulee Dam. The original authorities to establish Leavenworth NFH are:

- *Grand Coulee Dam Project, 49 Stat. 1028, 08/30/1935*
- *Grand Coulee Fish Maintenance Project, 04/03/1937*
- *Mitchell Act, 52 Stat. 345, 05/11/1938*
- *Columbia Basin Project Act, 57 Stat. 14, 03/10/1943*
- *Fish and Wildlife Coordination Act, 60 Stat. 1080, 08/14/1946*
- *Mitchell Act (amended), 60 Stat. 932, 08/14/1946*

Specific fishery objectives which were originally established for Leavenworth NFH were:

- 1) "...to bring, by stream rehabilitation and supplemental planting, the fish populations in the 677 miles of tributary streams between Grand Coulee Dam

and Rock Island Dam, up to figures commensurate with earlier undisturbed conditions and with the natural food supply in the streams.”

- 2) “...to produce, in addition, by the combination of artificial spawning, feeding, rearing and planting in these streams, a supplemental downstream migration equivalent to that normally produced by the 1,245 miles of streams and tributaries above the Grand Coulee Dam.”

### **2.3 Facility and Site Descriptions**

The hatchery facilities consists of a nursery/office building, maintenance shop, feed/cold-storage building, four equipment storage buildings, three water reuse pump buildings, seven well structures, one covered sand settling basin, two screen chambers, and four residences (one of which was converted to an I & E office). A description of hatchery buildings, their primary use, and improvements are listed in Attachment 5.

The hatchery’s outdoor rearing units include 2 – 15’ x 150’ adult holding ponds, 14 – 10’ x 100’ raceways, 45 – 8’ x 80’ raceways, and one display pond. Also present, but in poor condition, are forty small and thirteen large Foster-Lucas ponds. These ponds are not used for the Leavenworth NFH production program (see Attachment 6 for physical measurements of incubation and rearing units).

The physical layout of the hatchery is diagramed in Attachment 7.

### **2.4 Archeology/Cultural Resources**

Reference: National Register of Historic Places Document 2/25/98

In recognition of its significance to the United States’ cultural heritage, the Washington State Advisory Council on Historic Preservation and the United States Department of the Interior entered the Leavenworth National Fish Hatchery in the National Register of Historic Places, July 27, 1998.

The three primary Leavenworth Hatchery buildings of historic and archeological significance include the hatchery/office building, cold storage/freezer building and the garage/shop building. These were all constructed between 1939 and 1940 and have always been important to the function of Leavenworth as a state-of-the-art hatchery. The design and size of the buildings was originally based on the number and types of fish to be reared. In the late 1930's, biologists estimated the massive scale for Leavenworth based on the abundant native salmon runs in the upper Columbia River that would be blocked by Grand Coulee Dam. The three buildings have been altered to some extent, but remain as dominant features of the hatchery.

Other historical structures and facilities include the three original historic ponds and wood frame sheds in the original Icicle Creek channel. These structures were removed in the summer of 2003 during the implementation of the Icicle Creek Restoration Project.



The original hatchery trays and troughs used for salmon egg incubation, 40 small and 15 of the 30 large rearing ponds, known as Foster-Lucas ponds, and the Icicle Creek diversion canal built in 1939 all currently exist. The canal remains virtually unchanged since its construction and is an important element of the hatchery landscape.

The Snow Lake Reservoir and tunnel was built by the Bureau of Reclamation to serve as a supplemental water source for the hatchery during the summer months when Icicle Creek is low and warm. Snow Lake, a natural wilderness lake located in the Alpine Lakes Wilderness area, is approximately 8 miles to the southwest of the Leavenworth Hatchery and sits almost one mile in elevation above the hatchery. The USFWS is the landowner of more than 700 acres surrounding the Snow Lake Reservoir. The engineers and construction crews, during the years 1939-1942, tapped Snow Lake with a pipe and valve system located near its base. The concept works much like a faucet. When water is needed, the valve from Snow Lake is opened and water sprays from the pipe, down the rocky slope into Nada Lake, where Snow Creek originates, which feeds directly into Icicle Creek. The lake water helps maintain a consistent cool water flow in Icicle Creek (Nielson 1940). A 7 x 9 ft. tunnel was cut through 2, 250 ft. of solid granite rock to the bottom of Snow Lake. This amazing engineering feat required several crews of men to cut the tunnel. In the summer of 1938, the Forest Service constructed the 30" wide trail from the Icicle Creek road up to Nada and Snow Lakes to make access possible for the project. A year-round base camp was established at Nada Lake for the construction crews. (Grand Coulee Project Report 1938:46).

Other historic resources of the Leavenworth facility include seven Leavenworth residences, built from September 1940 to March 1941. Each house was a Bureau of Reclamation design following the very same floor plan. They are 1 ½ story side-gabled houses with moderately pitched roofs and are simply finished with clipped gables, boxed eaves and single car garages. All of the houses have a rear shed roof dormer. Four of these residences exist today and have been altered to some degree. Another housing area was located on the south end of the hatchery property and served as living quarters for a crew of carpenters in 1939. They have recently been remodeled and now serve as office space for the Mid-Columbia River Fishery Resource Office.

The blacktop road leading to the old Icicle Creek spawning shed sites was built in 1939 and is still in good condition. Today, the roads are only used for Service vehicle traffic and as an easement to private property dwellings. The single-lane, pony truss steel bridge spans the spillway dam on the Icicle Creek diversion canal. The bridge was also constructed in 1939-40.

A total of 68 historic resources (historic buildings and ponds combined) are listed in Table 1 of the National Register of Historic Places nomination form (1998) because they were built between 1939 and 1941 and are related to the original function and design of the hatchery for the Columbia Basin Restoration project's requirements for artificial fish propagation. These resources reflect the "as-built" design of the massive hatchery project and retain excellent integrity of location, setting, design, workmanship, feeling and materials.

Cultural resources surveys have been conducted on portions of the LNFH as required by the NHPA prior to ground disturbing projects. No archaeological resources have been identified that are associated with Native American use of the property and there is a low potential for discovering any new archaeological deposits because of the tremendous amount of disturbance caused by the construction of LNFH which altered the original ground surface and stream bank (EIS 2002).

## **2.5 Watershed/Ecosystem Setting<sup>2</sup>**

**General Description:** The Wenatchee River drains a portion of the east slopes of the Cascade Mountains in north central Washington within Chelan County. The river flows generally in a southeasterly direction, emptying into the Columbia River at the City of Wenatchee at Columbia River Mile (RM) 468.4. The Wenatchee River subbasin encompasses approximately 1,371 square miles (877,400 acres), with 230 miles of major streams and rivers. The subbasin originates in high mountainous regions of the Cascade Mountains, with numerous tributaries draining subalpine regions within the Alpine Lakes and Glacier Peak wilderness areas. It is bounded on the west by the crest of the Cascade Mountains, on the north and east by the Entiat Mountains, and to the south by the Wenatchee Range. The Little Wenatchee and White Rivers flow into Lake Wenatchee, the source of the Wenatchee River. From the lake outlet at Wenatchee RM 54.2, the river descends rapidly through Tumwater Canyon, dropping into a lower gradient section in the region of Leavenworth, where Icicle Creek joins the mainstem (RM 25.6). Other major tributaries include Nason Creek (RM 53.6), the Chiwawa River (RM 48.4), Chumstick (RM 23.5), Peshastin (RM 17.9), and Mission (RM 10.4) creeks (Attachment 8).

**Geology:** The waters of the Wenatchee River flow from and through the most diverse occurrence of rock types of any river in Chelan County. Glacier ice carved the pathway, allowing the river and its tributaries to cross many geologic boundaries. The immense elevation difference between the town of Wenatchee (615 feet) and Stuart Peak (9,470 feet) was created by the uplifting of the Cascade Mountains and the down-cutting of the Columbia River.

The last large scale glaciations occurred more than 10,000 years ago. For thousands of years snow accumulation continued to exceed snow melt and, as a result, large masses of ice gradually moved from higher elevations down slope. As they moved, one layer would combine with another and another until the combined weight and abrasive features were sufficient to cut down through any rock mass. The glaciers also provided huge amounts of melt water that flowed downstream towards the Columbia River creating outwash deposits which are composed of deep deposits of silt, sand, and gravel. A

---

<sup>2</sup> Adapted from *Salmon, Steelhead, and Bull Trout Habitat Limiting Factors For the Wenatchee Subbasin* (Water Resource Inventory Area 45. Final Report, November 2001 (Andonaegui, C.).

review of well logs indicates sediments thicken to over 170 feet along the main axis of the Lake Wenatchee valley (Economic and Engineering Services and Golder Associates 1998). In some places within the subbasin, (near the confluence of Icicle Creek and the Wenatchee River), the deposits may be up to 300 feet in depth (M. Karrer, USFS, pers. Comm., 2001).

**Climate and Hydrology:** The Cascade Mountains and the prevailing westerly winds are the dominant climatic factors influencing the subbasin. Moist air from the Pacific Ocean uplifts and cools as it moves east over the mountains. Most precipitation occurs in late fall and winter. The Cascade Mountain area is characterized by heavy precipitation, with nearly 150 inches annually. Most of the precipitation occurs during the winter months as snow. Snow depths in the mountains range from 10 to 20 feet and snow covers the mountain areas from late fall through early summer. Temperatures at Wenatchee range from a January mean of 26.2 ° F to a July average of 73.4 ° F (CCCD 1998). As air masses move east toward the Columbia Basin, moisture progressively decreases, resulting in arid conditions within the lowermost region of the subbasin.

Most of the stream flow in the Wenatchee subbasin originates from several large tributaries in the upper portion of the subbasin. Five tributaries – the Chiwawa River, White River, Little Wenatchee River, Nason and Icicle Creeks – are the source of over 94% of the surface water within the subbasin, whereas their drainage area represents only 58% of the total subbasin (Montgomery Water Group et al. 1995).

The Icicle Creek watershed is the largest tributary drainage in the Wenatchee River subbasin, providing 20% of the low season flows (CCCD 1996). Precipitation ranges from 120 inches at the crest of the Cascades to 20 inches at the mouth. Extreme flows recorded in Icicle Creek vary from a minimum of 44 cfs (lowest monthly mean discharge of 66.2 cfs occurred in November 1953; Hinds 1994) to a maximum of 11,600 cfs (May 28, 1948) as measured at the USGS gauging station located above Snow Creek (RM 5.4, upstream of all major diversions; Hinds 1994). Natural water storage capacity exists in the high elevation cirque basins and deposits of glacial till in the valley bottoms (USFS 1995a).

**Fish and Wildlife:** A complete description of listed and candidate species which may occur in the area of the hatchery (Icicle Creek) are included in Attachment 9. Three species of anadromous salmon, spring and summer Chinook (*Oncorhynchus tshawytscha*), sockeye (*O. nerka*), and summer steelhead (*O. mykiss*) are present in the Wenatchee subbasin. Coho stocks (*O. kisutch*) were historically abundant in the subbasin but have been an extirpated stock since the early 1900's, although an effort is currently underway to reintroduce this species in the upper Columbia Basin. A number of other resident fish also occur throughout the subbasin, including bull trout (*Salvelinus confluentus*), which is present in fluvial, adfluvial, and resident life history forms (Attachment 10).

The rivers of the Wenatchee subbasin historically were excellent salmonid producing streams. However, by the 1930's, the anadromous runs were decimated

because of over-fishing in the lower Columbia River fisheries, irrigation diversion practices in the subbasin, and habitat degradation related to poor mining practices, grazing and logging. By 1971, this situation was exacerbated by the construction of seven dams on the Columbia River between the mouth of the Columbia River and the confluence of the Wenatchee River.

The Upper Columbia Evolutionarily Significant Unit (ESU) of spring Chinook was listed as endangered under the federal ESA on March 16, 1999. The Washington State Salmon and Steelhead Stock Inventory (SASSI) has identified four spring Chinook stocks in the Wenatchee subbasin; the Chiwawa River, Nason Creek, Little Wenatchee River, and White River. A fifth stock, the Leavenworth NFH stock is unlisted (Carson NFH ancestry) and supports the only spring Chinook fishery in the mid and upper Columbia Basin.

The summer Chinook run in the upper Columbia is not listed under the ESA. Only one stock has been identified in the Wenatchee subbasin, and is classified as “Healthy” based on escapement (SASSI). This run is one of the largest naturally produced Chinook populations in the Columbia Basin (WDF/WDW 1993).

Sockeye were once widespread and abundant in the Columbia River system, including the upper Columbia area now blocked by Grand Coulee Dam. Neither of the two stocks that remain in the upper Columbia region, the Wenatchee and Okanogan, are listed under the ESA. The SASSI lists the Wenatchee stock as “Healthy” based on escapement.

The Upper Columbia ESU of summer steelhead was listed as endangered under the ESA on August 18, 1997. Only one stock was identified in the Wenatchee subbasin (WDF/WDW 1993) and is classified as “Depressed” based on chronically low production.

The Upper Columbia Distinct Population Segment (DPS) of bull trout was listed as threatened under the ESA on June 12, 1998. The 1998 Bull Trout and Dolly Varden Appendix to the SASSI, identifies 11 bull trout stocks in the Wenatchee subbasin (Andonaegui 2001). They are the Icicle, Ingalls, Chiwaukum, Chikamin, Rock, Phelps, Nason, Panther, Little Wenatchee, Chiwawa, and White River stocks. Four of the 11 stocks have been classified as “Healthy” (Chikamin, Rock, Phelps, and Panther) with the remaining 7 listed as “Unknown” based on the trend of abundance data available at the time the classifications were made.

The wide diversity of available habitats in the Wenatchee River watershed indicates a high probability of diverse assemblages of wildlife species. Based on the habitat types found in the Wenatchee subbasin, 15 amphibian species, 227 bird species, 90 mammal species, and 19 reptile species are thought to occur (WDFW 2002).

**Vegetation:** Listed and candidate species which may occur in the area of the hatchery are included in Attachment 9.

The climatic, elevation and geologic diversity of the Wenatchee subbasin is also reflected in its plant communities. Although most of the subbasin is forested, the species composition of the forest plant communities changes as elevation decreases and distance from the Cascade Mountain crest increases. Non-forest vegetation occurs primarily at the lowest elevation (shrub-steppe communities) and the highest elevation (alpine meadow communities) (WDFW 2002).

Watersheds closest to the Cascade Mountain crest experience a maritime climatic influence as moist maritime air incursion occurs. Maritime-influenced vegetation is dominant in the White, Nason, Chiwawa, and Little Wenatchee watersheds. Icicle Creek watershed supports significant amounts of both maritime and continental (arid) vegetation. Shrubs and herbs dominate the vegetated alpine areas of these watersheds. Mountain hemlock, silver fir, and western hemlock dominate the maritime-influenced communities, which also support numerous understory plants. Open forests of mountain hemlock, whitebark pine, and subalpine larch can be found at the extreme upper elevation limits for trees (CCCD 1996).

Watersheds further from the Cascade Mountain crest in distance and lower in elevation experience much less moisture, resulting in a more arid continental climate. Plant communities found in the mainstem Wenatchee, Mission, Chumstick, and Peshastin watersheds, as well as portions of the Icicle watershed are more continental in nature. Forest areas in these watersheds are dominated at climax by subalpine fir, grand fir, Douglas fir, or ponderosa pine.

Some of the most rare plant species endemic to Washington State are found in the subbasin, including showy stickseed, Wenatchee larkspur, Oregon checkermallow, clustered lady's slipper, several grapeferns, Thompson's chaenactis, bristly sedge, bulb-bearing waterhemlock, pine broomrape, Ross' avens, and long-sepaled globe mallow. A number of other sensitive plants are also found in the subbasin (Andonaegui 2001).

**Habitat Condition:** Within the subbasin, human alterations to the environment are exacerbating naturally limiting conditions by reducing habitat quality and quantity, thereby reducing a species' chances of successfully completing its life cycle. These alterations have primarily occurred in the lower gradient, lower reaches of watersheds in the lower subbasin and include road building and replacement, conversion of riparian habitat to agriculture and residential development, water diversion, reduced large woody debris (LWD) recruitment, and flood control efforts that include LWD removal, berm construction, and stream channelization (Andonaegui 2001). For a complete and detailed description of the Wenatchee subbasin, see Andonaegui 2001 and WDFW 2002.

**Land Use and Ownership:** The primary land uses within the Wenatchee River subbasin are forestry, wilderness, agriculture, range, residential, and recreation. The federal government is the largest landowner in the subbasin, with approximately 671,220 acres (76% of the subbasin; CCCD 1996) under the management of the USFS. The BLM manages a very small area of the subbasin, approximately 200 acres. The majority of

federal lands lie in the upper and middle portions of watersheds located in the northern portion of the subbasin. The largest portion of USFS land (316,561 acres) is designated Wilderness (47%); the DNR manages approximately 8,700 acres in the subbasin; Longview Fibre company managers estimate their timber company manages 47,760 acres (CCCD 1996). Only 17% of the subbasin is privately owned (excluding Longview Fibre lands), totaling 149,560. Privately owned lands occur mostly in the low lying valley bottoms and more private land is located in the southern portion of the subbasin next to the Wenatchee River and along its major tributaries.

## **2.6 History of Hatchery Stocks**

**Legal Authority:** Leavenworth NFH was authorized by the Grand Coulee Fish Maintenance Project, April 3, 1937 and reauthorized by the Mitchell Act (52 Stat. 345), May 11, 1938. The Mitchell Act authorized the Secretary of Commerce "...to establish one or more salmon cultural stations in the Columbia Basin in each of the states of Oregon, Washington, and Idaho." The hatchery is one of three mid-Columbia stations constructed by the Bureau of Reclamation (BOR) as fish mitigation facilities for the Grand Coulee Dam, Columbia Basin Project. Although reauthorized by the Mitchell Act, funding was provided through a transfer of funds from the BOR to the Service until 1945. From 1945 to 1993, the Service had funding, management, and operation responsibilities for the Complex. Beginning on October 1, 1993, the BOR assumed funding responsibility for the Complex while the Service continues to manage and operate the three facilities (Leavenworth, Entiat, and Winthrop NFH's).

In addition to the initial authorizations listed in Section 2.2, hatchery operations are authorized, sanctioned and influenced by the following treaties, judicial decisions and specific legislation:

- Treaty with the Walla Walla, Cayuse, Umatilla Tribes, 06/09/1855
- Treaty with the Yakama, 06/09/1855
- Treaty with the Nez Perce, 06/25/1855
- Treaty with the Tribes of Middle Oregon, 06/25/1855
- Executive Order (Treaty with Bands of Colville), 04/08/1872
- U.s. v. Oregon (Sohappy v. Smith, "Belloni Decision", Case 899), 07/08/1969
- Endangered Species Act of 1973, 87 Stat. 884, 12/28/1973
- Salmon and Steelhead Conservation and Enhancement Act, 94 Stat. 3299, 12/22/1980
- Pacific Salmon Treaty Act of 1985 (U.S./Canada Pacific Salmon Treaty), Public Law 99-5, 16 U.S.C. 3631, 03/15/1985

### **Production and Management History:**

In 1899, a hatchery was constructed on the Wenatchee River near the Chiwaukum railroad station just above Tumwater Canyon. Eggs were taken at once and soon fry were released. Unfortunately, the species of salmon spawned is not mentioned. This hatchery was closed in 1904. The reasons given were: extreme cold weather, heavy snow, isolated

location and consequent expense of operating, freshets, and the fact that it was too far upriver to secure the best variety of eggs (Mullan et. al. 1992).

After the closure of this hatchery, there were no activities connected with artificial production on the Wenatchee River until 1913 when a new facility was constructed at the town of Leavenworth. Very few eggs of any species were secured at any time by this hatchery until it was abandoned in 1931. Attempts were made to import eggs from other areas, including the McKenzie and Willamette hatcheries in Oregon, and Little White Salmon hatchery in Washington State (Mullan et. al. 1992).

The records of the hatchery operations at both above Tumwater Canyon and Leavenworth indicate that it was not possible to secure either early run Chinook or any other variety of that species in significant numbers, hence their demise.

The following history section was derived from excerpts taken from hatchery annual reports (1940 to present), the National Register of Historic Places, and Fish and Hanavan (1948). Direct quotes are used whenever possible as they reflect the thoughts and writing styles of that era.

“The construction of the Columbia River Grand Coulee Dam in eastern Washington, the largest man made thing in the world, will be forever a barrier preventing the several species of Pacific Coast salmons and steelhead trout from ascending the Columbia River to their original natural spawning grounds and the river channel below the dam site is not suitable for natural spawning. Therefore, when the construction of the Grand Coulee Dam was undertaken by the U. S. Bureau of Reclamation, it was recognized and accepted that the Bureau of Reclamation would be responsible for the perpetuation of the salmon runs by artificial means.” This program was designated The Columbia River Migratory Fish Control Program. “It was at the outset decided that the U. S. Bureau of Reclamation would bear the cost of the work and that such work be supervised and conducted by the Washington State Fisheries Department. In 1936, plans for the Leavenworth hatchery were initiated by a survey along tributary streams of the Columbia River in search of suitable hatchery locations. The survey team recommended the Leavenworth location because of the natural S-curve meander necessary for spawning ponds and the large terrace that would easily accommodate the large rearing ponds and hatchery buildings needed for the extensive fish-culture operation. The original plans for LNFH were quite grandiose in scale. “A main hatchery nearly as large as a city block on a site approximately one-half mile wide and one mile long with more than 70 acres of ponds to spawn and care for 66,000,000 salmon annually are included in the recommendation to the Bureau and approved by the U.S. Department of Fisheries, State Dept. of Fisheries and State Game Department” (1937). Although scaled-down from its original design, when completed, LNFH (1941) was the largest hatchery in the world.

“It was decided to construct traps and elevators in the three fish ladders of Rock Island Dam where the salmon and steelhead would be trapped on their way to their spawning grounds, loaded into specially designed and constructed fish hauling trucks, and hauled to other waters, to be released there for either natural or artificial spawning. The program

decided on called for a large hatchery at Leavenworth equipped with necessary rearing ponds and also with holding ponds in the main channel of Icicle Creek for holding the adult fish in to ripen that will be caught and hauled from Rock Island Dam. Smaller hatchery units and rearing ponds were planned for the Entiat River, for the Methow River at Winthrop, and for the Okanogan River in British Columbia.”

“During the early months of 1939 it was decided that such salmon salvage program should be carried out by the U. S. Bureau of Fisheries rather than by the Washington State Fisheries department. By the spring of 1939, the construction work on Grand Coulee Dam has progressed to the point where the 1939 run of salmon would not be able to reach the waters of the upper Columbia River. However, the Leavenworth hatchery construction work did not actually get under way until the early summer of 1939 and therefore the 1939 run of salmon could not be hauled to and impounded in the Icicle Creek holding ponds. Accordingly, the 1939 run of salmon and steelhead had to be hauled to and impounded in other streams suitable for natural spawning. Consequently, for such impounding and natural spawning the following streams were selected: Nason Creek for Chinook and steelhead; Wenatchee River below Lake Wenatchee for Chinook and steelhead; Entiat River for Chinook and steelhead; and Lake Wenatchee and Lake Osoyoos for blueback salmon (sockeye).” Weirs were installed in these tributaries to keep the adults from exiting the systems. The construction of the Leavenworth Station was carried on during the winter of 1939 – 1940 by the Bureau of Reclamation (BOR).

“The Icicle Creek holding ponds were not yet ready to receive fish when the 1940 spring run of steelhead and Chinook began entering the Rock Island ladders and therefore it was necessary to impound these fish in Nason Creek until such Icicle Creek holding ponds were ready in early June.” “Holding ponds for retaining adult fish, during the resting period between the time of their arrival in the Grand Coulee area and the onset of sexual maturity, were formed in a three-quarter mile section of the Icicle Creek bed across which four dams were built creating three separate holding areas. The uppermost dam was designed to regulate the flow of Icicle Creek water through the holding ponds and to divert excess water through a by-pass, 4,000 feet in length, re-entering Icicle Creek below the lowest holding area. Each holding area contained a deep and shallow section separated by a picket rack equipped with a power-operated lift gate. The deep section was planned for retaining the salmon during the holding period and the fish were to be seined for spawning as they sought the shallow area upstream with the onset of sexual maturity.” The three “natural” ponds were only used for about five years because of several critical flaws (except for the most northerly pond which has been used occasionally as an adult holding pond through the years). The number and variety of fish hauled to the holding ponds, along with native returns, clogged the stream and made egg collection difficult. Loss to predators was extremely high in the shallow ponds, while the sluggish stream flow and high temperatures in the summer caused unhealthy conditions.

The production history at LNFH has been quite varied (Attachment 11). Species reared include Chinook, steelhead, coho, sockeye, kokanee, cutthroat, rainbow, and brook trout. Eggs and/or juveniles have been shipped to several locations, from Tennessee to the country of Spain. From 1939 to 1943, adult fish were trapped at Rock Island Dam and the majority of these were planted in area tributaries for natural spawning. Since these tributaries were probably not the stream of origin for these adults, a picket weir was



placed in-stream to forcibly keep them from leaving the selected stream. Sockeye salmon adults were planted in Lake Wenatchee. Weirs were installed on the Little Wenatchee and White rivers. When the adults started their spawning migration, they were captured at the weir and spawned. The eggs were then brought to LNFH for rearing. Many problems were encountered in the early years with obtaining adults for brood and in keeping them alive until spawn time. Water temperatures were often lethally warm and pre-spawn mortality exceeded 70% in some years. Few adults were collected in Icicle Creek, even when numbers were high over Rock Island Dam. Adult trapping in Icicle Creek didn't start until mid August, which was probably the reason such low numbers entered the trap.

In 1951, the steelhead program was discontinued. "The collection of steelhead eggs and rearing of the resulting fish was not carried on during the year in as much as the State of Washington Department of Game has found that unless steelhead are reared at least through the first winter, it is better to leave them alone. Leavenworth's water conditions are not adequate to raise any amount of fish through the winter." Up to this point (1951), the juveniles were released as sub-yearlings and the poor adult returns were probably a reflection of this. The 1974 annual report states "historically, LNFH has experienced difficulties in growing spring Chinook and coho larger than 20/lb in the 14 month rearing period. Well and river water is basically too cold for optimum growth." In 1974, hatchery staff designed and built a reuse incubation system incorporating the addition of heated water, bio-filters, and aspirators. This was used for the incubation of the fingerling stocks on hand and provided a considerable "jump" on the normal growth patterns. For spring Chinook, from February 1st to July 1st, size was more than double than previously. The objective here was to get the fish to 20/lb prior to the winter months. In 1976, production shifted to spring Chinook only (2.2M). But the annual report states "every year a small number of steelhead return to the hatchery. This has prompted an initial experiment of 100,000 steelhead to be incubated and released at LNFH in an attempt to establish a run." Due to low adult returns resulting from the program, steelhead production was moved to the Winthrop facility in 1995, where it continues today with great success.

In 1976, a major rehabilitation project began. Goal was to increase the meager water supply and improve production facilities. By 1980, completed construction included 45 raceways, two adult holding ponds, fish ladder, pollution abatement pond, aeration chamber, pipelines to accommodate all facilities, an emergency generator was installed and power-lines were put underground. In 1992, production was reduced to 1.625 million due to the lack of water and density/disease concerns. The sand-settling basin was built in 1995, mainly in response to the 1994 fires and the potential debris load in Icicle Creek. The 1994 fires burned thousands of acres in the Icicle Creek basin upstream of the hatchery.

The Wenatchee River Canal was built in 1939, but was used very little. "The Wenatchee River supply was originally designed to supplement the deficiency of Icicle Creek during the summer months. After flowing through the three-mile open ditch between the intake and the hatchery, however, the Wenatchee River water reaches a maximum temperature in the mid-80's, thus far exceeding the temperature suitable for coldwater fish culture." During low water years, the Wenatchee River around Dryden would go dry due to

diversions at the dam for power. Water released from Snow Lakes was used to augment flows. As mentioned elsewhere in this report, the Snow Lakes project was quite an engineering marvel. Other than previously stated, "The toughest individual task was moving the 2,800-pound gate valve which fits into the pipe in the tunnel's mouth. This job took a month to complete; the valve was hauled up the narrow, 6 mile path in two pieces. Some places in the path had to be blasted to widen it enough to allow the packhorses and sled to proceed." "On October 16, 1939 the 13 month project had reached its final stage and everyone was assembled to view the blast, from above the lake. Unfortunately, the blast did not occur on schedule because of a short in the electrical wire to the powder charge. Fixing the wire required several men to crawl through the 30-inch steel pipe that has been imbedded in concrete at the tunnel's mouth. They then had to haul in scaffolding and a ladder to get across the numerous sump holes in the floor of the bore. These sumps were dug to catch any rocks or debris that might get into the tunnel when the dynamite blast was set off and the rush of water came in." "The successful charge was detonated at 6:15 in the evening, the dynamite blast cracked the bottom of the lake and water gushed to fill the tunnel, held in check by the gate valve."

In 1940, a slight modification in the operation of the Snow Lake tunnel was necessary because of the "high winds", up to 60 m.p.h., experienced in the tunnel when the valve was open. To remedy the condition, the 30-inch diameter pipe was extended 124 feet to the tunnel portal, and the 28-inch valve was relocated outside the tunnel. A shelter was constructed over the valve at the tunnel portal.

In 1958, a new well was drilled to bring the total number to three. The well water was critical for tempering Icicle Creek water during the winter months. The lack of well water was the biggest limiting factor for fish production. In 1976, four new wells were under construction to help alleviate this. It wasn't until 1983 when all seven wells were operable.

Initial products used for fish food included horse meat, beef and pork liver, heart, spleen, etc. Salmon carcasses were also used. The fish food supply was quite variable and the lack of dependence upon any single meat product made it necessary to frequently shift the diet. Anemia was common, but was eventually cured by the feeding of beef liver (although the supply of beef liver was insufficient). In 1943, the use of horse meat was discontinued and the use of salmon viscera was elevated. Eventually, the use of raw fish products proved to be a large cause of disease and elevated mortality. Throughout the early years, fish foods were hard to obtain. At the height of feeding, up to 1,800 pounds of food was used each day. For example, in 1956, a total of 378,000 pounds of food was used. One person's single duty was to mix the food. The products were chunked while frozen, fed through a grinder and into a mixing bowl. In the late 1950's, fish feed "pellets" were fed experimentally with poor results. In 1959, 60, several feed experiments were conducted with great success. In 1962, a new "starter" diet was tried on sockeye with great success. Fish foods have evolved tremendously since then, and some now include medications for the treatment of diseases.

In 1989, an attempt was made to feed the adult brood (frozen krill) but was discontinued because the adults would not consume the offerings.

Little was known about diseases in salmonids at the time LNFH went into operation, particularly in the treatment of them. In 1941, diseases present were; *Eastern Gill Disease* (caused high mortality in sockeye), *Costia*, *Western Gill Disease*, and *Octomitus* and *Mussel Glochidia* were very prevalent in summer, but ceased when the use of Wenatchee River water was discontinued. *Gas Bubble Disease* also occurred, but only when the “upper” well was used (two wells tapped at that time). *Stalked Ciliate* was also present, but caused little mortality. In 1942, *Columnaris* broke in the sockeye population with very high mortality. Interestingly, of the two stocks of sockeye on station (Quinault and those trapped at Rock Island Dam), only the Quinault stock experienced the high mortality although both stocks had the disease. During the early 1950's, huge losses of juvenile sockeye was experienced (95% in one year) due to an unknown virus. This same protozoan was found in coho and Chinook and resulted in losses of 50%. In 1981, 820,000 spring Chinook eggs received from Little White Salmon NFH were found to have *Infectious hematopoietic necrosis virus* (IHNV), which were all destroyed. For several years, IHNV was found in several broods of fish, and these were all destroyed. In 1983, in an attempt to curb IHNV, infected eggs were incubated separately from non-infected eggs. An experiment was tried in 1981 where some of the adult brood were injected with erythromycin prior to spawning, probably to battle Bacterial Kidney Disease (BKD). Both of the above procedures are still used today.

Materials used to treat the various problems were Calomel, acetic acid, beechwood creosote, formalin, potassium permanganate, salt and others. In 1944, weekly prophylactic treatments of Rocco effectively eliminated all disease outbreaks of Bacterial Gill Disease (BGD). In 1957, Lignasan-X was tried to combat BGD. It appeared to work as well as potassium permanganate, but costs 16 times less.

Fungus on the returning adults was also a major cause of mortality, causing almost complete loss of brood in some years. This was surely elevated by the extremely high water temperatures found in the holding ponds.

During the initial years, labor was difficult to obtain due to low pay and WWII. Many supplies were in very short supply at this time. Vehicles were scarce and particularly parts for repairs and tires (all due to WWII).

Fish propagation in the early years was a perpetual experiment. Many studies were conducted in an attempt to alleviate these uncertainties. A “homing” study was started in 1943 where adults (jacks) captured at Rock Island Dam were tagged and released above the structure. The thought was that these fish would “stray” to the base of Grand Coulee Dam instead of returning to their stream of origin. No adults were seen at G. C. Dam. These “jacks” were the progeny of the 1939-40 brood which were trucked to the various tributaries below the dam, and forced to spawn in the tributaries. Other efforts included redd surveys where the redds were checked throughout the winter to document emergence and migrational times for sockeye and kokanee.

In 1984, the first sport fishery was conducted on Icicle Creek on adults returning to LNFH.

In 1994, approximately 35 fires started between 7/24 and 7/29. Thousands of firefighters from 25 states were camped on hatchery grounds.

## **2.7 Biological Risks and Ecological Interactions Between Hatchery (non-listed) Spring Chinook Salmon and Wild (listed) Summer Steelhead, Spring Chinook Salmon and Bull Trout.**

All hatcheries must consider their potential for adversely affecting the aquatic community. To help assess potential impacts, the Service has developed several Biological Assessments (BA), and currently is in the “Phase II” portion of drafting Hatchery and Genetic Management Plans (HGMP) for fish hatcheries in the upper-Columbia River, including Leavenworth NFH. These management plans were drafted to assess our program and meet Endangered Species Act requirements identified by NOAA Fisheries and the Service. It is anticipated that the HGMP’s will be updated regularly and re-submitted to NOAA Fisheries and the Service. In the upper-Columbia Basin, the initial BA (1994) covered potential hatchery impacts to listed Snake River sockeye and spring, summer, and fall Chinook salmon. Since this original BA, the Service has crafted BA’s to cover listed upper-Columbia River summer steelhead (1997), listed and unlisted spring Chinook salmon (1999), and bull trout (1999). While these documents fulfilled the requirements under the ESA, they have recently been replaced with the HGMP’s to better describe the programs and their potential impacts. These impacts include: water withdrawal and effluent discharge, broodstock collection, genetic introgression, juvenile fish releases, disease, competition, predation, residualism, and migration corridor and ocean impacts. NOAA Fisheries determination to date is that “the federal artificial propagation programs proposed for operation of funding by the USFWS and BPA in the UCR basin are not likely to jeopardize the continued existence of these listed ESU’s or to destroy or adversely modify their habitat.”

In addition to completing documentation to comply with our ESA responsibilities, we must also meet our mitigation responsibilities under the Mitchell Act as well as our Tribal Trust and U.S. v. Oregon obligations. In order to balance these sometimes conflicting mandates, we regularly meet with our co-managers to discuss operation and management of the hatchery.

The following information was extracted primarily from our November 2002 Draft HGMP and summarizes biological risks and ecological interactions between hatchery (non-listed) spring Chinook salmon and wild (listed) summer steelhead, spring Chinook, and bull trout. This document is available at the hatchery.

**Hatchery Water Intake and Use (current):**

The hatchery's water delivery system consists of three major components and conveyance systems: 1) the gravity intake on Icicle Creek, 2) the Snow Lake Supplementation Water Supply Project and, 3) the well system on hatchery property.

The intake is located at rm 4.5, approximately 1.5 miles upstream of the hatchery. Water is conveyed to the hatchery through a buried 31-inch pipe system. This water enters a sand-settling basin and on through two screen chambers prior to its arrival at the hatchery. The water intake structure consists of a diversion dam, fish ladder, wide bar trash rack (6 inch spacing) and another narrower bar trash rack (1 1/2 inch spacing) located in a building. This structure is currently not properly screened, according to current NMFS specifications, but plans are underway to bring it into full compliance.

Entrained fish in the system can return to the river several ways: 1) the Cascade irrigation diversion, which branches off the system below the intake, has a drum screen to divert fish into a sluiceway back to the river, 2) the overflow area at the sand-settling basin can pass fish back to the river via effluent and, 3) the two screen chambers. One is within a building and is equipped with 1/8 inch x 1/8 inch plastic coated screens which divert fish into a bypass pipe to the river. The other screen chamber is covered and is equipped with 3/32-inch round-holed screens, which divert fish into an overflow channel leading back to the river. From both screen chambers, water is delivered to the rearing ponds and back to the river. Both screen chambers meet the standards for screening criteria described in the *1994 Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* developed by NMFS.

During construction of the hatchery, it was recognized that surface flow in Icicle Creek might at times be insufficient and/or too warm to meet production demands. A supplementary water supply project in Snow and Nada Lakes was therefore developed and a water right to 16,000 acre feet of Snow Lake was obtained. These lakes are located approximately 7 miles from the hatchery and about one-mile above it in elevation. A 1/2 mile tunnel was drilled and blasted through granite to the bottom of Snow Lake and a control valve was installed at the outlet of the tunnel. Operation of the control valve is determined by Icicle Creek flow and water temperature. The control valve is typically opened mid-July or as soon as the creek water consistently reaches 58°F (D. Davies pers. comm.). Water drained from Snow Lake enters Nada Lake, which drains into Snow Creek, a tributary to Icicle Creek that enters at RM 5.5. Thus, supplemental flows, ranging from 45 to 60 cfs from Snow Creek, enter Icicle Creek one-mile above LNFH's intake system.

**Broodstock Collection:**

All brood stock is obtained from adults volunteering to the hatchery's collection ladder. A barrier dam, located just above the ladder, blocks fish from areas above the hatchery. The collection ladder typically operates from May into July. Adults are collected from throughout the run. This action results in excess brood, which is periodically alleviated by donating surplus adults to various tribes and non-profit groups.

Natural spawning of spring Chinook occurs in Icicle Creek (D. Carie pers. comm.). However, these adults are believed to be Leavenworth NFH fish that do not return to the hatchery. A few stray hatchery spring Chinook from other locations have been noted by decoding of coded-wire tags from adult fish. Adults from Leavenworth NFH, straying to other tributaries, appears to be low.

#### **Genetic Introgression:**

Coded-wire tag recoveries indicate that returning adults of LNFH origin have a high fidelity to Icicle Creek. Few adults are recovered outside of Icicle Creek. Therefore, genetic introgression of spring Chinook released from Leavenworth NFH with other spring Chinook stocks is not considered a significant problem. The Service is currently marking 100% of the juveniles released from Leavenworth NFH to better quantify the degree of straying (potential genetic introgression) of our returning adults.

#### **Hatchery Production:**

Leavenworth NFH spring Chinook releases are moderate in magnitude relative to other Columbia River Spring Chinook production programs. Leavenworth NFH releases have been reduced from a previous program level of 2.2 million spring Chinook and 100,000 summer steelhead to the current 1.625 million spring Chinook smolt level. Reduced production decreases density dependant effects and other potential ecological effects on natural stocks. Juvenile out-migration trapping and PIT tag monitoring at McNary Dam (see Chapter 3 Monitoring and Evaluation discussion on PIT tagging) indicate that Leavenworth spring Chinook exit Icicle Creek and the Wenatchee River quickly after release, which further reduces density dependant effects. The Service will continue to evaluate our release strategies and production numbers to minimize any negative effect upon the aquatic community, especially on listed species.

#### **Disease:**

Hatchery programs are routinely monitored to identify pathogens early and prevent disease outbreaks, if possible. Pathogens can enter hatcheries through returning adult fish, surface water supplies, and other mechanisms involving direct contact with naturally occurring resident fish or spawning adults. Crowding and stress decrease the physiological resistance of salmonid fishes to infection and increase the likelihood of disease (Salonius and Iwama 1993; Schreck et al. 1993) and amplification of the pathogen. Concern exists that diseases in hatcheries may increase the risk of disease in natural populations that come in contact with the hatchery population or hatchery effluent.

Fish health managers largely understand the kinds, abundance and virulence (epidemiology) of pathogens and parasites in hatchery fish. Recent studies suggest that the prevalence of some pathogens in naturally reproducing populations may be higher than in hatchery populations (Elliot and Pascho 1994). Indeed, the occurrences of high ELISA titers for *Renibacterium salmoninarum*, the causative agent of Bacterial Kidney Disease (BKD), appears, in general, to be significantly higher among wild smolts of spring/summer Chinook salmon than hatchery smolts (Congleton et al. 1995; Elliot et al. 1997). For example, 95% versus 68% of wild and hatchery smolts, respectively, at

Lower Granite Dam in 1995 had detectable levels of *R. salmoninarum* (Congleton et al. 1995). Although pathogens may cause significant post-release mortality among hatchery fish, there is little evidence that hatchery origin fish routinely infect naturally produced salmon and steelhead in the Pacific Northwest (Enhancement Planning Team 1986; Steward and Bjornn 1990). In spite of this lack of evidence, some biologists believe disease-related losses often go undetected, and that the impact of disease on naturally spawning populations may be underestimated (Goede 1986; Steward and Bjornn 1990).

Leavenworth NFH follows USFWS policy, Federal regulations, Integrated Hatchery Operations Team (IHOT 1995) protocols, and Pacific Northwest Fish Health Protection Committee protocols for disease sampling and treatment. The Olympia Fish Health Center is located in Olympia, WA so that fish health sampling, diagnosis, control and treatment recommendations, and policy guidance are readily available as fish health issues arise. Chapter 3 provides more detail on Fish Health practices. The fish health goal for Leavenworth NFH is to release healthy and physiologically fit fish which have a minimal negative impact on wild populations.

Leavenworth NFH is currently attempting to control disease and release healthy migration-ready fish to minimize their impact on natural fish. Based on the relative prevalence of BKD among hatchery and wild Chinook salmon (Elliot et al. 1997; Congleton et al. 1995), the crowding and handling of fish at dams at the time of barging or bypass may have a greater likelihood of increasing the incidence of disease among naturally produced fish than direct infection from hatchery fish.

### **Competition:**

When hatchery-origin Chinook are released into the Wenatchee River Basin, the potential exists for intra- and inter-specific competition with natural-origin juvenile salmonids, including listed spring Chinook salmon and steelhead (NMFS 2001). Listed spring Chinook and steelhead are present year-round in Upper Columbia River region tributary and mainstem areas. Spring Chinook fry emerge from the gravel in late winter or early spring at an average size of approximately 30 mm fl, with most fry immediately moving downstream to mainstem tributary areas for rearing (NMFS 2001). Upper Columbia River spring Chinook salmon migrating seaward as yearling fish between April and June, average 87 to 127 mm fl (NMFS 2001). Steelhead fry egress from late spring through August at a size of 30 to 33 mm fl (NMFS 2001). The fry disperse to downstream areas in late summer and fall. Upper Columbia River steelhead emigrate seaward as age 2+ (43.2%) or 3+ (46.4%) smolts (Peven 1990) during April and May at an average size of 163 to 188 mm (Chapman et al. 1994).

For the species viewed as posing competition risks by SIWG (1984), spring Chinook, summer Chinook, and coho salmon yearling smolts released from the hatcheries by the action agencies (which includes LNFH) in April and May likely encounter newly emerged, listed spring Chinook salmon fry adjacent to the hatchery release sites. These release groups may also encounter spring Chinook fry and juvenile steelhead in river reaches downstream of the release sites. Emigrating spring Chinook and steelhead smolts in the action area may also be encountered during the hatchery fish emigration period.

The SIWG (1984) identified a high risk that competition by hatchery-origin Chinook and coho salmon juveniles will have a significant negative impact on productivity of wild Chinook salmon and steelhead juveniles in freshwater. Due to the fact that no listed spring Chinook stocks reside in Icicle Creek, coupled with minimal spawning in areas below the Icicle confluence, these impacts would be lessened.

The release of migration-ready smolts limits the duration of interaction between the hatchery fish and listed spring Chinook and steelhead rearing in areas adjacent to, and downstream of, the hatchery fish release locations. This release practice therefore likely decreases resource competition and behavioral dominance risks posed by the larger hatchery fish. The larger size of the hatchery fish relative to the wild fry and fingerlings present at the time of releases also decreases the likelihood for competition for the same food resources by the hatchery and wild fish. The larger, seaward migrating hatchery smolts will also tend to use different habitat than rearing steelhead and spring Chinook fry and fingerlings that may be encountered (NMFS 2001).

**Predation:**

By virtue of their large size compared to wild juvenile fish that they may encounter after release, and considering the areas where hatchery fish are released, hatchery spring Chinook yearlings have the potential to prey upon listed fish in the Wenatchee River Basin and mainstem Columbia River (NMFS 2001). The SIWG (1984) identified that the release of hatchery Chinook and coho salmon would adversely affect the productivity of wild Chinook and steelhead populations through predation, but to what extent is unknown.

Hatchery spring Chinook salmon yearling predation on wild Chinook juveniles has been documented in other Columbia River Basin areas. Spring Chinook yearling releases from LNFH are made into Icicle Creek, which lacks a listed spring Chinook population. Listed spring Chinook production in the mainstem Wenatchee River downstream of this release location is low (NMFS 2001). Based on recent spawner counts, most spring Chinook production occurs in tributaries well upstream of the mouth of Icicle Creek. The number of Wenatchee Basin-origin spring Chinook fry that may be encountered and affected during LNFH spring Chinook yearling emigration is expected to be low (NMFS 2001). However, predation effects of the LNFH spring Chinook and WDFW's summer Chinook salmon programs on rearing unlisted natural-origin summer Chinook fry may be substantial (NMFS 2001), but this has not been confirmed.

Hatchery spring Chinook released at LNFH in April and May, may encounter emigrating spring Chinook and steelhead smolts in the action area during the hatchery fish release and downstream migration period. Predation by hatchery fish on listed spring Chinook and steelhead smolts commingling with hatchery fish during seaward emigration is unlikely, given the similar size of hatchery salmon and wild spring Chinook, and the generally larger size of emigrating wild steelhead smolts (NMFS 2001). The hatchery releases may pose indirect predation risks to the wild fish in Basin reaches where hatchery fish are densely distributed and commingled with wild fish, however, by attracting avian or fish predators (NMFS 2001).



**Residualism:**

Spring Chinook, summer Chinook, sockeye, and coho salmon released from hatcheries as yearling smolts do not have the same potential to residualize as steelhead (NMFS 2001). Standardization of the life history of these salmon species by producing yearling smolts differs from the variability in growth and advent of smoltification evident in wild fish populations. The hatchery production strategies designed to release uniform sized smolt groups limit the likelihood for residualization of the salmon released (NMFS 2001).

Residualization by LNFH yearling spring Chinook salmon, leading to the occurrence of precocious male spring Chinook, may be a risk factor for listed wild adult spring Chinook in the Wenatchee River Basin (NMFS 2001). The existence of non-migrating, precocious males is common and characteristic of hatchery and wild spring Chinook stocks in the region at low proportions (1% to 3% of yearling populations) (USFWS 1999). These precocious fish may contribute to reproduction in natural spring Chinook spawning areas, but the extent of any contribution is unknown. The risk of adverse effects may be reduced by an apparent higher mortality rate for these precocious fish relative to non-maturing juvenile fish, and a low stray rate to areas outside of the hatchery release location (NMFS 2001).

**Migration Corridor/Ocean:**

The Columbia River hatchery production ceiling called for in the Proposed Recovery Plan for Snake River Salmon of approximately 197.4 million fish (1994 release levels) has been incorporated by NOAA Fisheries into their recent hatchery biological opinions to address potential mainstem corridor and ocean effects as well as other potential ecological effects from hatchery fish. Although hatchery releases occur throughout the year, approximately 80 percent occur from April to June (NMFS 1999a) and Columbia River out-migration occurs primarily from April through August. Leavenworth's spring Chinook production is typically released in April at the beginning of the normal hatchery and natural stock out-migration season. The total number of hatchery fish released in the Columbia River basin has declined by about 26 percent since 1994 (NMFS 1999c) reducing potential ecological interactions throughout the basin.

Ocean rearing conditions are dynamic. Consequently, fish culture programs might cause density-dependent effects during years of low ocean productivity, especially in near shore areas affected by upwelling (Chapman and Witty 1993). To date, research has not demonstrated that hatchery and naturally produced salmonids compete directly in the ocean, or that the survival and return rates of naturally produced and hatchery origin fish are inversely related to the number of hatchery origin smolts entering the ocean (Enhancement Planning Team 1986). If competition occurs, it most likely occurs in near shore areas when (a) upwelling is suppressed due to warm ocean temperatures and/or (b) when the abundance or concentration of smolts entering the ocean is relatively high. However, we are only beginning to understand the food-chain effects of cyclic, warm ocean conditions in the eastern North Pacific Ocean and associated impacts on salmon survival and productivity (Beamish 1995; Mantua et al. 1997). Consequently, the potential for competition effects in the ocean cannot be discounted (Emlen et al. 1990).

Alternatively, the hatchery program may be filling an ecological niche in the freshwater and marine ecosystem. A large number of species are known to utilize juvenile and adult salmon as a nutrient and food base (Groot and Margolis 1991; and McNeil and Himsworth 1980). Pacific salmon carcasses are also important for nutrient input back to freshwater streams (Cederholm et al. 1999). Reductions and extinctions of wild populations of salmon could reduce overall ecosystem productivity. Because of this, hatchery production has the potential for playing an important role in population dynamics of predator-prey relationships and community ecology. The Service speculates that these relationships may be particularly important (as either ecological risks or benefits) in years of low productivity and shifting climactic cycles.

**Harvest:**

Many adult salmon returning to Leavenworth NFH are harvested in the terminal tribal and sport fisheries in Icicle Creek. This activity is directed by WDFW and the state must consult on these fisheries annually, prior to harvest. The Yakama Nation, in cooperation with WDFW, set tribal fishing seasons and limits.

**2.8 Beneficial Uses (historic and present cultural and public uses, fishery benefits, harvest contribution, and economic value).****Public Uses:**

The Leavenworth National Fish Hatchery serves 150,000 visitors annually. Permitted Special Uses on hatchery lands include a cross-country ski trail system managed by the Leavenworth Winter Sports Club, summer horseback rides and winter sleigh rides operated by Icicle Outfitters, outdoor theater managed by Leavenworth Summer Theater and the Friends of Northwest Hatcheries and the Boy Scouts utilize the former Gun Club Building for weekly meetings and activities. Other uses for the public include guided and self-guided hatchery tours, sport fishing for spring Chinook salmon, walking on the accessible Icicle Creek Nature Trail, and bicycling and picnicking at Hatchery Park. Requests are received throughout the year for special events produced by community organizations. The largest special event is the Wenatchee River Salmon Festival held annually in September for the public. This multi-partner nature festival provides interactive natural resource education, promotes outdoor recreation and shares the cultural significance of salmon to the people of the northwest.

**Harvest Contribution:**

Spring Chinook salmon from Leavenworth NFH have, over the years, supported successful sport and tribal fisheries in the Wenatchee River and Icicle Creek, and to a lesser extent, the Columbia River. Due to the ESA listed stocks in the Wenatchee Basin above Icicle Creek, this fishery is now limited to the Icicle only. For example, in 2002, the sport catch in Icicle Creek was 1,201, with tribal harvest at 3,793, and 6,458 returned to the hatchery (WDFW 2002b). In 2003, WDFW estimated that 4,016 anglers fished a total of 29,133 hours (WDFW 2003).

**Economic Benefit:**

No specific analysis of the economic benefits of the hatchery and its fish production to the local economy has been done, but it is likely variable depending on the strength of the salmon return. When attempting to estimate the benefits of an anadromous fish hatchery, environmental conditions outside the hatchery are cyclic and beyond the control of hatchery administrators (e.g. ocean conditions and water releases from the dams). This environmental variability can subsequently affect post-release survival of juveniles and number of adult returns. During times of good ocean and river conditions that result in healthy adult returns, significant economic activity is generated through harvest of Leavenworth NFH spring Chinook salmon. For example, in 2002, WDFW estimated that 3,811 anglers fished 17,150 hours in Icicle Creek as a direct result of Leavenworth NFH adult spring Chinook salmon.

In addition, the role of a Federal mitigation hatchery is to compensate for natural habitat lost to Federal hydro-projects. It follows then, that the economic benefit of the mitigation hatchery is interwoven into the economic benefit of the hydro-power projects being mitigated for and that the hatchery can be characterized as an operating expense of the hydropower project. The Service recognizes that mitigation hatcheries may be extremely important in supporting economically important fisheries, especially at a local level.

**Cultural Values:**

The Yakama Nation shares the in-river harvest of spring Chinook salmon returning to Leavenworth NFH and is also a beneficiary of surplus spring Chinook salmon which have entered the hatchery holding ponds. The cultural significance of these fish to the tribes is best characterized by the following quotations:

*“For the Yakama people salmon is seen as one of the gifts from the Creator. Since the beginning of time the Yakama people have relied upon salmon as well as the roots, berries, deer, elk and herbal medicines still important today. When the Yakama people were placed on this part of Mother Earth they were told by the Creator that He was going to give us some gifts. Those gifts came in the form of salmon and other natural resources.*

*He also instructed the Yakama people on how to care for the resources and warned that if any of the resources disappear, then we too as people, would disappear. That is why the Yakama people continually care for the salmon, the deer, the elk, the roots, the berries and the herbal medicines. We are also taught at a very young age that we are not here on Mother Earth to live and go away. Our Yakama elders tell us that we are only borrowing the water, the salmon, the Yakama language and everything else and we are preparing for the up and coming generations. It’s like remembering the future.”* Carol Craig, Yakama Nation Fisheries Resource Management, Public Information Officer, personal communication.

*“Salmon was presented to me and my family through our religion as our brother. The same with the deer. And our sisters are the roots and berries. And you would treat them*

*as such. Their life to you is just as important as another person would be.”* Margeret Saluskin, Yakama Nation, Columbia River Inter-Tribal Fish Commission Web-Page.

Other tribes benefiting from surplus adults are the Colville Confederated Tribes, Spokane Tribe, Kalispel Tribe, and the Snoqualmie Tribe, along with a portion going to the local chapter of Trout Unlimited (TU). TU uses the proceeds from these fish for habitat improvement projects.

## CHAPTER 3. HATCHERY AND RESOURCE MANAGEMENT

### 3.1 Hatchery Goals, Objectives, and Tasks

The following Hatchery Management Goals were adapted from the Mitchell Act, Endangered Species Act (ESA) Biological Opinions, U.S. v. Oregon agreements, and the Integrated Hatchery Operations Team – Operation Plans for Anadromous Fish Production Facilities in the Columbia River Basin, Volume III – Washington, Annual Report for 1995 (IHOT 1996).

**Goal 1:** Produce fish species and numbers commensurate with those lost/affected by the construction of Grand Coulee Dam. Assure that hatchery operations support Columbia River Fish Management Plan (U.S. v. Oregon) production and harvest objectives.

Objective 1: Produce sufficient spring Chinook smolts to result in adult returns in excess of desired hatchery escapement.

Task 1: Collect and spawn sufficient brood stock (adults) to achieve desired juvenile release goal.

Task 2: Incubate eggs and rear juveniles using best management practices to reduce and eliminate diseases, optimize physiological fitness and obtain maximum survival of released smolts.

Task 3: Release or transport smolts using best methodologies to assure optimum survival during out-migration.

Objective 2: Assure that LNFH, in conjunction with Entiat and Winthrop NFH's, are fully mitigating (within their means) for anadromous fish losses caused by Grand Coulee Dam.

Task 1: Assess types of anadromous fish species affected by the construction of Grand Coulee Dam.

Task 2: Determine if current production numbers are sufficiently contributing to the mitigation goals, i.e., public fisheries, etc.

Task 3: Participate in the development of and ensure compliance with fishery management plans that establish production targets.

Objective 3: Contribute to a meaningful harvest for sport, tribal, and commercial fisheries annually in the Columbia River and Icicle Creek (achieve an average of 0.5% smolt to adult survival, harvest plus escapement).

Task 1: Work with states and tribes to establish meaningful fisheries (through U.S. v. Oregon forums or other management agreements).

Task 2: Mass mark juvenile hatchery fish prior to release to enable state agencies to implement desired fisheries and to evaluate the effectiveness of the hatchery program.

Objective 4: Work with interested parties to manage adult fish returning in excess of brood stock needs and those available for harvest.

Task 1: When feasible, utilize surplus adults to meet fishery conservation and recovery needs within and outside the Wenatchee Basin.

Task 2: Donate surplus adults that enter the hatchery to tribes for ceremonial and subsistence purposes.

Objective 5: Meet tribal trust responsibilities.

Task 1: Follow pertinent Laws, Agreements, Policies and Executive Orders and Consultation and Coordination with Native American Tribes.

Task 2: Hold an annual coordination meeting between the Service and Yakama Nation to identify and report on issues of interest and coordinate management.

Task 3: Assist, when feasible, tribal efforts in restoring salmonid populations to areas where stocks have been extirpated.

Objective 6: Communicate and coordinate effectively with other salmon producers and managers in the Columbia River Basin.

Task 1: Participate in U.S v. Oregon Production Advisory Committee (PAC) and Technical Advisory Committee (TAC) meetings when Leavenworth NFH Complex issues are being addressed.

Task 2: Develop technical reports for PAC and TAC, among others.

Task 3: Hold Hatchery Evaluation Team (HET) meetings each spring and fall to review progress, evaluate current programs, and propose changes as needed.

Objective 7: Conduct monitoring and evaluation to ensure Objectives 1 and 2 are achieved.

Task 1: Coded-wire-tag a representative portion of production fish.

Task 2: Bio-sample returning adults.

Task 3: Produce an annual report on stock assessment and contribution to fisheries.

Task 4: Compare survival, life history, fisheries contribution, and fish health parameters at Leavenworth NFH to other State, Tribal, and National Fish Hatcheries producing spring Chinook in the Columbia River Basin.

Objective 8: Maximize survival at all life stages using disease control and prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Task 1: Routinely perform necropsies of clinically healthy and moribund fish to assess health status and detect problems before they progress to clinical disease or mortality.

Task 2: Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal needs and environmental conditions in the hatchery rearing container based on historical disease events.

Task 3: Follow USFWS Fish Health Policy and Implementation Guidelines (FW 713 1-5) on the introduction of stocks into a facility which may result in the introduction of a new disease condition or mortality.

Task 4: Use sanitation procedures which prevent introduction of pathogens into and/or within a facility.

Task 5: Conduct applied research on new and existing disease prevention techniques.

Task 6: Utilize pond management strategies (e.g., Density Index, Water Exchange Rates, and Flow Index) to help optimize the quality of the aquatic environment and minimize fish stress which can induce infectious and non-infectious diseases.

Objective 9: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Task 1: On a routine basis, monitor NPDES compliance of effluent hatchery water.

Task 2: On a routine basis, monitor influent hatchery water supply as it pertains to fish health guidelines.

**Goal 2:** Minimize impacts to ESA listed and other native species, their habitat, and the environment.

Objective 1: Minimize negative interactions with other fish populations by implementing state-of-the-art fish culture technology.

Task 1: Draft and implement actions identified in a Hatchery and Genetic Management Plan.

Task 2: Release juvenile fish (smolts) that are ready to migrate downstream.

Task 3: Mass mark all production fish to identify them from naturally produced fish.

Task 4: Support projects for restoration of ESA listed salmonids in the Wenatchee River Basin, when funded.

Task 5: Upgrade hatchery intake and water delivery system to meet criteria described by NOAA Fisheries.

Task 6: Manage hatchery ladder within acceptable impacts to listed and native fish.

Task 7: Monitor interactions between hatchery and wild fish in the Wenatchee River Basin (see Objective #2 below).

Objective 2: Conduct monitoring and evaluation to ensure goal #2 is achieved.

Task 1: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Task 2: Assess straying (rates and where) of hatchery fish from Leavenworth NFH.

Task 3: Monitor health and disease status of fish, following Service Fish Health Policy, attending Fish Health biologist, and IHOT guidelines.

Task 4: Support efforts to gain additional/sufficient information on hatchery/wild fish interactions and reproductive success of hatchery fish spawning in the natural environment.

Task 5: Develop a study plan to assess physiological status of juveniles prior to release (unfunded) and determine downstream migration rates (PIT tagging).

Objective 3: Assess the impacts of hatchery operations and facility structures on Icicle Creek.



Task 1: Assess and address, when feasible, impacts of hatchery structures as they affect fish passage to areas above the facility.

Task 2: Assess and address affects associated with the hatchery's water diversion and intake structure and its potential to negatively impact downriver habitat due to water withdrawal.

**Goal 3:** Provide the public with quality aquatic interpretation and education, customer service and comprehensive outreach to enhance public understanding, participation and support of Service and Leavenworth NFH programs.

Objective 1: Increase visibility and credibility of Leavenworth NFH.

Task 1: Coordinate with other federal, state, county and city governments with partnerships in natural resource education and information dissemination.

Task 2: Build and implement interagency cooperation with existing and new programs in the mid and upper Columbia River Basin.

Task 3: Coordinate with multiple partners including the U.S. Forest Service, Bureau of Reclamation, Tribes, schools and community businesses to host special events such as the annual Wenatchee River Salmon Festival, National Fishing and Boating Week, Kids in the Creek, Watershed Watchers, and more.

Task 4: Coordinate with regional and national Outreach Team members to develop consistent current messages on the Fisheries Strategic Vision, contemporary issues, and Fisheries Outreach activities.

Task 5: Increase and manage compatible public uses on hatchery land that link the community and the Service.

Task 6: Provide current Hatchery and Service project information to the media, elected officials, and all interested parties.

Task 7: Continue to build relationship with the *Friends of Northwest Hatcheries* (non-profit hatchery support group), nurturing relationships with board members and coordinating staffing and support for their projects and programs.

Objective 2: Provide information and education about Service programs and Leavenworth NFH to internal and external audiences.

Task 1: Continue existing and develop new cooperative agreements and partnerships with public, private, non-profit organizations and schools.

Task 2: Maintain website, continue building media relations with local radio and newspapers, provide presentations to Service Clubs, special interest groups, regional and national conferences regarding agency issues and station activities.

Task 3: Provide quality customer service at the Hatchery for visitors seven days per week providing guided and self-guided tours, customized interpretive signing, environmental education, and continued updating of Visitor Center messages.

Objective 3: Continue to develop forums for public participation (or input) into Leavenworth NFH issues and projects.

Task 1: Regularly participate in organizations and meetings supporting Wenatchee River Basin watershed activities.

Task 2: Hold meetings throughout the year with local service clubs and conservation groups, partners, and Icicle Creek neighboring landowners to keep abreast of current hatchery issues and public concerns.

Task 3: Provide volunteer opportunities for public involvement with hatchery operations and educational programs.

Objective 4: Conduct monitoring and program evaluation to ensure all Outreach goals are met.

Task 1: Develop outreach evaluation tools in conjunction with Regional Outreach Team.

Task 2: Distribute teacher evaluations of key Outreach programs and activities to ensure that the public is receiving current and comprehensive meaningful experiences, education and information.

Objective 5: Share information regarding the history and historic character of the Leavenworth NFH station.

Task 1: Continue interpretive programs that focus on the history of the hatchery, when and why it was constructed, and the types of fish reared.

Task 2: Continue maintaining the buildings and structures in a manner that meets the *Secretary of the Interior's Standards for the Treatment of Historic Properties* because they are an important tangible link to the history of the hatchery.

### 3.2 Current Practices to Achieve Goals, Objectives, and Tasks

#### **Water Use and Management:**

Leavenworth NFH holds the following certificates of water rights:

Source	Certificate No.	Date	Flow/Amount	Use
Icicle Creek	1824	3/26/42	42 cfs	Fish Propagation
Snow and Nada Lakes	1825	3/26/42	16,000 AF (Acre Feet)	Fish Propagation
Well #1 (ground water)	3103-A	10/16/57	1,129 AF	Fish Propagation
Well #2	016379	June 1940	730 AF	Fish Propagation
Well #3	016378	August 1939	579 AF	Fish Propagation
Wells 4 - 7	G4-27115C	10/20/80	5,257 AF	Fish Propagation

The main water source for the hatchery is Icicle Creek, and Wells 1-7 are used as a secondary supply, but generally used year round. Snow and Nada Lakes are used to supplement Icicle Creek's low summer flows. Wells (ground water) are used to temper Icicle Creek water and for incubation. Icicle Creek, and Snow and Nada Lakes waters are delivered to the hatchery via gravity flow and all rearing units receive either single-pass or second-use water. All well water is pumped to a central point then gravity fed to rearing units.

Because well water is high in nitrogen, the receiving water is first passed through a de-gassing system, then on to the hatchery.

#### **Screening:**

The current Icicle Creek water intake and some of the delivery system is part of the original construction of the Hatchery (1939 and 1940). The system is deteriorating rapidly and causing operational and maintenance problems and uncertainties for the Hatchery. Icicle Creek transports large amounts of silt and sediment during heavy spring runoff resulting in accumulation of significant amounts of sediment at the intake and intake works. The failure to remove these materials results in restricted flows into the intake over time, especially during the summer months.

Current fish screening and bypass measures are located at the downstream end of the supply pipe near the Hatchery rather than at the point of diversion, which is preferred and less stressful on fish. Protection measures were developed and upgraded over the years as screening requirements became more stringent. However, these measures have been retrofitted into older technology systems that are not recommended in today's regulatory environment. The (unscreened) Icicle intake and water conveyance system does not meet current Federal and State criteria concerning the protection of migrating and resident populations of fish in Icicle Creek.

Within the next few years (2005-2006), proposed plans are to replace and upgrade the Hatchery's gravity intake including construction of a fish ladder, new intake, and fish screening facility. This includes a pump-back system to operate during the late summer and early fall and other low-flow periods to mitigate for Hatchery intake withdrawals should Icicle Creek flow fall below minimum in-stream flow levels.

#### **Conveyance System to Hatchery and Ponds:**

From the intake to Cascade Orchards Irrigation Company's diversion, which is about 1,200 feet, the pipeline is a 33 inch mortar-lined pipe. From the irrigation diversion, 5,100 feet of a 31 inch mortar-lined pipeline continues to a sand settling basin located just prior to the screen structures.

The replacement of the supply pipeline from the intake to the Hatchery is part of the proposed intake construction contract.

#### **Effluent Treatment and Monitoring:**

Raceway and nursery tank cleaning effluent is sent to a pollution abatement pond where solids are removed prior to discharge to Icicle Creek. Cleaning effluent and total discharge (normal operation) effluent are monitored weekly for suspended and settleable solids. Environmental Protection Agency standards have only been exceeded once (1998) for either cleaning effluent or total discharge since monitoring began in 1974.

#### **Brood Stock Management:**

The following performance measures have been established at the hatchery.

Performance Measures	Hatchery Goal	5-Year Average	Range
Spawning population <sup>3</sup>	1,000	910	838 - 986
Fish release (millions)	1.62	1.56	1.29 - 1.68
Egg transfers (thousands)	0		
Fish transfers (thousands)	150*	66.9	50 - 148
Adults passed upstream	0		
Percent survival juvenile to adult <sup>4</sup>	0.50	0.26	0.08 – 0.62
Smolt size at release (fish/lb)	18	18.1	16.2 - 22.4

\* - Short-term Colville Program.

Leavenworth NFH is currently a single species facility rearing only the "Carson lineage" stock of spring Chinook. However, Leavenworth NFH has not imported the Carson eggs or fry for over twenty years. Brood stock collection at the hatchery is managed to maintain the genetic integrity of the stock. The Service management goals are to ensure that adult brood stock is randomly collected for spawning across the run in proportion to

<sup>3</sup> females plus males (including jacks spawned), averaged years, 1999 - 2003

<sup>4</sup> smolt to adult survival for BY's 1992 - 1996

the rate at which they return. To accomplish this, two adult holding ponds are utilized. The east pond is designated for brood stock and the west pond randomly collects returning adults. For example, as the fish return, a proportion is moved to the east pond, which will then be used as brood. This strategy requires constant monitoring of the number of fish going over Rock Island Dam. Using historical data to determine what percentage of the Rock Island Dam will return to Leavenworth NFH, one can calculate the proportion to keep as the runs progress.

A Vaki River Watcher fish counter was installed in the holding pond entrance in May 2003. This unique counter, with an advertised accuracy of 95%, is capable of counting fish movements up and downstream. Each fish passing through the counter has a silhouette image scanned with a date and time attached to the computer generated file. Also from the image, species, length and height can be determined. In addition to the silhouette image, this model also takes up to five digital pictures for later species verification.

The counter was purchased to help increase the accuracy of adult counts, but additional benefits include a reduction in stress by limiting the number of times an adult is handled for counting purposes.

In May 2004, a PIT tag detector/reader was installed just upstream of the fish counter. This reader allows for additional data collection including travel time and survival.

Adult spring Chinook return to the hatchery from May through July. Years where large adult returns are expected the fish ladder is opened and closed periodically. This strategy allows additional harvest by sport and tribal fishers and reduces the number of excess fish handled by hatchery personnel.

The first spawning date is usually mid-August and most spawning is normally completed by the end of the month. The holding ponds are supplied with Icicle Creek water and tempered with well (ground) water to maintain a temperature between 45° - 50° F. The volumes of the ponds are such that density is not a concern. However, pond water flow is managed to meet or exceed one gallon of inflow per fish. The adults are injected with erythromycin, 30 days prior to spawning to control bacterial kidney disease. Adults are generally treated daily with formalin to control external parasites.

Eggs are taken each Tuesday to allow time between egg takes for fish to develop viable eggs and to coordinate sampling by the Olympia Fish Health Center. Ripe females are separated with equal amount of males the day before spawning to expedite the spawning procedure. The day of spawning, a small number of fish are crowded into a lift system and then to an anesthetic vat. Once the fish are anaesthetized they are placed on a table where males and females are separated and sacrificed via a sharp blow to the head. Ripe females are bled prior to spawning.

**Surplus Adult Returns:**

Most years, more fish enter the hatchery than are needed for brood stock. Brood stock excess to hatchery needs are transferred to the Bureau of Indian Affairs for distribution to the Yakama Nation, Colville Confederated Tribes, Spokane Indian Tribe, and others for ceremonial and subsistence use. Periodically, the local Trout Unlimited group will receive excess fish via a national agreement with the Service. Surplus fish or spawned males only can be used for stream enrichment, as the females are injected with erythromycin and thus cannot be used for this purpose. Erythromycin has not been cleared for use on food fish by the Federal Drug Administration; therefore, carcasses previously injected with erythromycin cannot be used for human consumption and must be buried on site. In accordance with the Pacific Northwest Fish Health Protection Committee draft Salmon and Steelhead Carcass Distribution Protocols pre-spawn mortalities cannot be used for stream enrichment and must be buried on site as well.

**Spawning Protocol:**

Fish are randomly selected and mated as close to a 1:1 male/female ratio as possible. Typically, the sex ratio for the returning adults is skewed 60/40 in favor of the females. During antibiotic injections (all fish are handled), the sex ratio is brought close to 1:1 by excessing surplus males or females. Because of the large number of total fish spawned, if needed, males may be used twice. If culling excess eggs (from non-BKD detected parents) is required, a portion from each mating is removed rather than a complete family unit. Jacks (age-3 males) are randomly included in the spawning population. Should a large number of jacks return, the number will be limited to 5% of the total number of males used (per Regional genetics guidelines).

The number of adults retained (capacity) for brood stock is based on density and flow indices, which relate to the amount of available water and space for juvenile rearing.

**Other Acceptable Stocks:**

If brood stock numbers are insufficient to meet hatchery production objectives, the hatchery will rear fewer fish. In case of a natural or man-made disaster, obtain stock from Carson or Little White Salmon NFH's.

**Upstream Passage:**

The barrier dam prevents fish from passing upstream of the hatchery. Hatchery fish volitionally enter the hatchery, homing to an upstream passage and hatchery discharge water. Generally, in recent years, less than five steelhead annually enter the adult holding ponds. All steelhead are returned to the river unharmed.

**Yakama Nation (YN) Coho Salmon Program:**

In 1996, the YN initiated a program to re-introduce coho salmon into the upper Columbia Basin. Starting with brood year 1997, approximately 450,000 coho smolts were transferred to Leavenworth NFH for acclimation and release into Icicle Creek. The old river channel behind Dam #5 was utilized. Since that time, and through an agreement with FWS, the tribe has upgraded and retrofitted several unused Foster Lucas Ponds for

their program. Currently, the FL's are used for acclimation and holding for release or transfer to other upper Columbia tributaries.

**Colville Confederated Tribes (CCT) program:**

Through an interim agreement with CCT, Leavenworth NFH has supplied up to 150,000 juvenile spring Chinook salmon annually for a re-introduction effort in the Okanogan River Basin. This program began in 2001 and the last fish from Leavenworth will be transferred to the tribe in fall 2004 or spring 2005.

### **3.4 Incubation Strategies and Procedures**

Eggs from each female are individually incubated until the eyed stage at which time dead eggs are removed. Viable eggs are counted and moved into deep trough trays for hatching and larval development. All incubation takes place in 44°-50° F well water. Eggs from females with high levels of Bacterial Kidney Disease are discarded unless needed to meet production goals. The first take of eggs hatch in mid-October.

### **3.5 Rearing Strategies**

Fry are moved to inside nursery tanks or deep troughs for their initial feeding in mid-December. Fry are fed BioOregon's starter feed and BioMoist Grower for the first six months.

During late February, fry are moved outside to 30, 8 x 80 raceways and remain there until after the previous broodyear is released and other raceways are cleaned and disinfected. The fish marking staff from Columbia River Fishery Program Office (CRFPO) tags, inventories and moves all fish in May. May is the optimal time to mark fish at this facility for a variety of reasons: 1) The fingerlings are about 100 fish/pound, a good size for marking and handling; 2) fingerlings are near their maximum pond density and need to be moved; 3) water temperatures are cool enough to facilitate successful handling. Marking at a later date with warmer water temperatures and larger fish size would negatively impact fish health.

All production ponds are full after inventory is complete. After spawning, the two adult ponds are cleaned and disinfected to receive fingerlings. In early October, fish from 30 raceways are moved to the two adult holding ponds and additional fish are added to the remaining 15, 8 x 80's. This action empties raceways for the next years fry. Fish will remain in these raceways until release.

Beginning with brood year 1991, rearing space has been managed so that density indices (the ratio of weight of fish to rearing unit volume and fish length) at no time exceed 0.2. In order to achieve these low indices, total production was reduced from 2.2 million to 1.625 million smolts. Reduced production numbers appears to have led to a decline of incidence of BKD.

### **3.6 Release Strategies**

Smolts are mass released directly into Icicle Creek at a size of 18 fish/pound to minimize interactions with other fish populations. There are no native spring Chinook stocks in Icicle Creek. Some hatchery spring Chinook spawn in Icicle Creek annually and ESA listed steelhead also utilize Icicle Creek for spawning and rearing. Releasing fish at 18 fish/pound or larger helps ensure that the released fish are functional smolts which actively migrate through Icicle Creek and the Wenatchee River corridor.

Smolts are released around the third week of April to coincide with normal spring migration and spill at Columbia River dams. It is likely that the fish are functional or near functional smolts at this time as evidence by their rapid migration to the Rock Island smolt trap (personal communications with Chelan PUD fish biologists). Detection of PIT tagged fish at McNary and Bonneville Dam's bypass facilities provides evidence of rapid movement of smolts released from Leavenworth NFH. The average travel time from release to McNary Dam, for release years 1998 – 2003, is 27.2 days, with a minimum travel time of 20 days in 1998 to a maximum time of 35 days in 2001. McNary Dam is approximately 204 miles from Leavenworth NFH. The average survival from release to McNary Dam is 57.1% with a minimum survival of 50% in 2001 to a high of 64% in 2003 (SURPH database, 2004).

### **3.7 Fish Health Management Program**

The primary objective of fish health management programs at Service hatcheries is to produce healthy smolts that will contribute to the program goals of that particular stock. Equally important is to prevent the introduction, amplification or spread of certain fish pathogens which might negatively affect the health of both hatchery and naturally producing stocks.

#### **Fish Health Policy:**

The Olympia Fish Health Center (FHC) in Olympia, WA provides fish health care for Leavenworth NFH under the auspices of the published policy 713 FW in the Fish and Wildlife Service Manual (FWM). In addition to this policy, the 1994 annual report "Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries", by the Integrated Hatchery Operations Team (IHOT 1995) provide further fish health guidelines as approved by northwestern state, federal, and tribal entities. The directives of these two documents more than meet the requirements of Washington's state and tribal fish health entities which follow the directives in the 1998 Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State.

The documents mentioned above provide guidance for preventing or minimizing diseases within and outside of the hatchery. In general, movements of live fish into or out of the hatchery must be approved in the U.S. v Oregon Production Advisory Committee forum and be noted on the State of Washington Brood Document for the hatchery. If a fish transfer or release is not on the Brood Document, permits from the Washington Department of Fish and Wildlife, the Service, and any other states through which the fish



travel must be obtained and approved by co-managers. Fish health exams and certifications must be completed prior to any releases or transfers from the hatchery to minimize the risk of disease transmittance to other populations.

### **Fish Health Examinations:**

**Routine examination:** A pathologist from the FHC visits approximately once per month to examine juvenile fish at the hatchery. From each stock and brood year of juveniles, fish are sampled to ascertain general health. Based on pathological signs, age of fish, concerns of hatchery personnel, and the history of the facility, the examining pathologist determines the appropriate tests. This usually includes a necropsy which includes microscopic examinations of the skin, gills, and internal organs. Kidneys (and other tissues, if necessary) will be checked for the common bacterial pathogens by culture and/or other tests specific for the particular pathogen of interest. Blood may be examined for signs of infection and cellular or biochemical abnormalities. Additional tests for virus or parasites are done if warranted. The pathologist may also examine fish which are moribund or freshly dead to ascertain potential disease problems in the stocks.

**Diagnostic Examination:** This is done on an as-needed basis as determined by the pathologist or requested by hatchery personnel. Moribund, freshly dead fish or fish with unusual signs or behavior are examined for disease using necropsy and appropriate diagnostic tests.

**Pre-release Examination:** Hatchery staff must notify OFHC at least six weeks prior to a release or transfer from the hatchery, when 60 fish from the stock of concern are sampled and tissues taken for testing of the required pathogens. The pathogens, defined in Service policy 713 FW (Fish and Wildlife Service Manual) for salmonids include infectious hematopoietic necrosis virus (IHNV), infectious pancreatic necrosis virus (IPNV), viral hemorrhagic septicemia virus (VHSV), *R. salmoninarum*, *Aeromonas salmonicida*, *Yersinia ruckeri*, and under certain circumstances other pathogens such as *Myxobolus cerebralis* and *Ceratomyxa shasta*.

**Adult Certification Examination:** At spawning, tissues from adult fish are collected to ascertain viral, bacterial, and parasite infections and to provide a brood health profile for the progeny. The FHC tests for the pathogens listed above and others as required for each stock and program. The minimum number of samples collected is defined by 713 FW. At Leavenworth NFH, all brood females are tested for *R. salmoninarum* (causative agent of BKD), with an identifying fish health number corresponding to each female's eggs so that selective culling and/or segregation is possible. This is done to reduce and control BKD, a vertically-transmitted disease. Progeny from females with high levels of BKD are culled and if progeny from moderate risk fish must be kept, they are segregated from progeny at lower risk and reared at lower densities to further reduce the risk of their developing clinical BKD and spreading it to the low risk group. The FHC provides results from testing as soon as possible for evaluation of management options.

**Chemotherapeutant Use:**

Administration of therapeutic drugs and chemicals to fish and eggs reared at Leavenworth NFH is performed only when necessary to effectively prevent, control, or treat disease conditions. All treatments will be administered in compliance with FDA and EPA regulations and agreements for the use of aquatic animal drugs and chemicals. (See also Chapter 4 “Drugs and Anesthetics”, “National Pollution Discharge Elimination System”, and “Investigational New Animal Drugs”)

Erythromycin injections for spring Chinook salmon female brood stock are critical to the control of bacterial kidney disease which is caused by a vertically transmitted bacterium (*R. salmoninarum*). In addition, erythromycin treatment helps control mortality and reduces horizontal transmission of *R. salmoninarum* among adults in the brood pond. Prior to the administration of erythromycin, surplus adults may be outplanted to nearby streams and/or made available to appropriate groups. Except for fish arriving too close to the time of spawning for safe handling, all spring Chinook salmon females kept for broodstock at Leavenworth NFH will be injected with erythromycin once, generally in mid-July. Since there is no INAD exemption permit or New Animal Drug Approval for this use, an extralabel veterinary prescription is written by a VMO at OFHC and injected carcasses are not used for stream nutritional enhancement or human or animal food.

Formalin treatment of adults held for brood stock are used a minimum of three times per week to control external pathogens during the holding period prior to spawning. More frequent use may be recommended by OFHC staff as conditions warrant.

Salmonid egg hardening and disinfection treatment with a polyvinylpyrrolidone iodine compound (approximately 1% iodine) is required by 713 FW policy to minimize/prevent transmittance of viral and bacterial pathogens. The eggs shall be disinfected in 50 ppm iodine in water buffered by sodium bicarbonate (at 0.01%) for 30 minutes during the water-hardening process. Eggs received at the hatchery must be disinfected before they are allowed to come in contact with the station’s water, rearing units or equipment. Specifics are provided in 713 FW policy.

**Other Fish Health Precautions:**

Eggs from female brood stock with high levels of BKD (a cut-off point selected by OFHC based on results from the Enzyme-Linked Immunosorbent Assay or ELISA) will not be used in production. If the number of brood females is low, progeny from moderately infected females may be segregated into rearing units apart from the rest of the production, reared at reduced densities as outlined in the USFWS/WDFW Fish Health Guidance letter of May 1, 2002 “Recommendations for Chinook fish health management in the mid and upper Columbia River” (Attachment 12) and strict disinfection and hygiene procedures implemented for equipment and rearing units associated with maintaining fish with this elevated level of risk on station.

With the exception of the above listed treatments, drugs and chemicals for treating eggs and fish are used on an “as needed” basis. Formalin treatments for adult brood stock are given to control external parasites and as a fungicide on eggs. Minimizing chemical and

drug use will not only reduce impacts on the local environment but will help maintain compliance with the various safety regulatory agencies, as well as reduce risks to employees.

Tank trucks and tagging trailers are disinfected before being brought onto the station and after use at the hatchery.

Abernathy Fish Technology Center provides routine quarterly proximate analysis on the feed to ensure that it meets the feed manufacturer's specifications. If nutritional concerns arise, Hatchery or Fish Health Center staff may consult with the Abernathy Fish Nutritionist who may then perform or coordinate testing for specific levels or quality of ingredients in the feed.

### **3.8 Monitoring, Evaluation, and Coordination**

The Mid-Columbia River Fishery Resource Office (MCRFRO) provides monitoring, evaluation, and coordination services concerning Leavenworth NFH production. MCRFRO staff monitors hatchery returns, biological characteristics of the hatchery stock, fish marking, tag recovery, and other aspects of the hatchery program, and they maintain the database that stores this information. MCRFRO also cooperates with the hatchery, fish health and technology centers, and co-managers to evaluate fish culture practices, assess impacts to native species, and coordinate hatchery programs both locally and regionally.

#### **Database Management:**

The Fisheries Information System (FIS) is a national database system for the Service's Fisheries Program. Each Service field office contributes to this database. The FIS consists of five different databases, two of which (Fish and Egg Distribution databases) document production accomplishments from all National Fish Hatcheries.

Information from and about Leavenworth NFH is connected to the broader fisheries community of the West Coast of the North American Continent through the U.S. Fish & Wildlife Service, Columbia River (information) System (CRiS). The following information is recorded in files that are components of the CRiS database: adult, jack and mini-jack returns to the hatchery; age, sex, length, mark and coded-wire tag information for returning fish that are sampled; egg development and disposition; the origin of fish raised at the hatchery; and fish transfers and releases. Leavenworth NFH maintains files containing information generated at the hatchery (brood stock management, incubation, rearing, and release). MCRFRO staff maintains files containing information on marked juvenile fish and on sampled adult fish (adult bio-samples).

Use of CRiS database files and programs achieves the following multiple purposes: 1) reduces the amount of effort expended to meet reporting requirements, 2) increases the quality and consistency of data, 3) facilitates development of software usable at all stations, 4) provides a platform on which to build effective evaluation tools which can be used by hatcheries, fisheries management and regional offices, and 5) facilitates the

exchange of information with other agencies. For example, release and recovery information is reported to both the Regional Mark Information Center and the StreamNet databases.

Computer programs that are components of the CRiS database are used to transform data into formats required by other agencies. These formats can be either electronic or printed. Other CRiS programs combine data from the hatchery, MCRFRO, and from databases maintained by other agencies into other formats to accomplish reporting, monitoring, and evaluation.

#### **Marking/Tagging Program:**

Juvenile fish are fin clipped, coded-wire tagged, and/or PIT tagged at Leavenworth NFH by the Columbia River Fisheries Program Office (CRFPO). The marking program is funded and directed by MCRFRO. This program is designed to monitor and evaluate fish culture techniques, survival and fishery contribution. Presently, spring Chinook salmon are 100% adipose fin-clipped and 50% carry a CWT at Leavenworth NFH to identify hatchery fish in selective fisheries and to measure the impacts on wild anadromous and resident stocks of fish in the upper-Columbia Region.

#### **Bio-sampling and Reporting:**

State and tribal coast-wide sampling of sport, tribal, and commercial fisheries, and hatchery rack return sampling by MCRFRO and the hatchery staff, provides near total recovery and survival estimates for each brood year released.

Coded-wire tag recovery information is used to evaluate the relative success of individual brood stocks and compare performance between years and hatcheries. This information is used by salmon harvest managers to develop plans to allow the harvest of excess hatchery fish while protecting threatened, endangered, or other stocks of concern.

Current bio-sampling efforts by MCRFRO involves removing snouts from all CWT present adults. In the past, all adults with missing adipose fins were considered to carry a CWT. The current marking program is 100% Ad-clip, whereas only about 50% also carry a CWT. Therefore, starting in 2005, all returning adults of LNFH origin will have missing adipose fins, but only half will carry a CWT. Snouts will be removed and the CWT extracted and de-coded for all returning adults with the tag. Current sampling efforts are geared to sample, on average, about 25% of the returning adults.

#### **Hatchery Evaluation Studies:**

Hatchery evaluation is the use of replicable, statistically defensible studies to guide management decisions. The hatchery evaluation vision action plan developed in 1993 for Region 1 Fisheries, describes hatchery evaluation in greater detail (USFWS 1993). The purpose of hatchery evaluation is to simply determine what works and doesn't work through planning, implementing, documenting, monitoring, analyzing, and reporting. We continually evaluate adult returns, sex ratios, fish sizes, brood returns, straying, smolt to adult survival and other parameters important to evaluating a hatchery program.

Additional studies at Leavenworth NFH have included: 1) a “hands off” study which evaluated the effects of using automatic feeders and partially covered raceways, as opposed to hand feeding with no covers; 2) three different densities were evaluated to determine post-release survival benefits; 3) fish groups with different ELISA values were evaluated to examine differences in rearing survival; 4) different bird exclusion devices were evaluated; 5) studied effects of using second-use water and its effect on fish health; 6) evaluated the use of dry versus moist feed and the effect on survival; and 7) comparison of using vertical stack versus deep trough trays during incubation. Information gained from some of these efforts has been incorporated into the production program.

**Stock Assessment and Contribution to Fisheries:** Substantial routine coded-wire tagging (CWT) of production fish under Bureau of Reclamation funding began with brood year 1986 and has continued at an average marking rate (yearling releases) of 15% for brood years 1986 – 1999. Beginning with brood year 2000 and continuing to present, all yearling releases have been 100% adipose fin-clipped. Additionally, coded-wire tagging has increased to 29% and 50% respectively, for brood years 2000 and 2001. All release information, including marked to unmarked ratios, is reported by MCRFRO to the Pacific States Marine Fisheries Commission (PSMFC). Mark and tag information from sampled fish, recovered in various fisheries, hatcheries, and spawning grounds, are also reported.

The Fish Passage Center (FPC, part of the Northwest Power Planning Council) has routinely applied Passive Integrated Transponder (PIT) tags to production releases beginning with brood year 1991 and continuing to present day. From brood years 1991-1995, approximately 1,000 fish were tagged annually to document survival and travel time through the Columbia River hydro-system. Marking was increased to approximately 7,500 fish annually from brood years 1996-1999. Beginning with brood year 2000 and continuing to brood year 2002, production releases have been intensively tagged at a rate of approximately 240,000 fish annually as part of a McNary Dam transportation study conducted by the Army Corp of Engineers (ACOE). Data collected from subsequent interrogation of PIT tags at various locations throughout the Columbia Basin is analyzed through FPC’s smolt monitoring program (SMP) and by ACOE.

As assessed by MCRFRO, the average survival for completed CWT brood years 1979 – 1995 is 0.25% with a standard deviation of 0.17%. The minimum survival was 0.009% for brood year 1990 and maximum survival was 0.65% for brood year 1988. Preliminary information indicates that recent brood year returns (1996-1998) have increased substantially with an average survival of 0.88% (stdev = 0.23%) with a current within basin return of 1.05% for brood year 1998 (Attachment 13). CWT information provides contribution estimates to various marine and freshwater fisheries in addition to recoveries at hatcheries or spawning grounds throughout the Columbia Basin. Data compiled by MCRFRO indicates, for return years 1999 – 2001, that approximately 40% of Leavenworth NFH spring Chinook were recovered at the hatchery, 28% were harvested in treaty/ceremonial fisheries (primarily Icicle Creek), 20% were captured in freshwater/Columbia River sport fisheries (13% Icicle Creek), 9% were recovered on

Wenatchee Basin spawning grounds (Icicle and Peshastin Creeks= 7%), and 3% were harvested in lower Columbia River gillnet fisheries (Attachment 14). Less than 1% was estimated to have been harvested in marine fisheries.

#### **Juvenile Monitoring:**

Juvenile fish at Leavenworth NFH are monitored on a routine basis by the hatchery staff to determine the condition factor of fry, fingerling and yearling fish. Samples are taken monthly for Bio-analysis by Olympia Fish Health Center to determine the health condition of fry, fingerlings, yearling and smolts prior to release.

#### **ESA Assessments, Ecological Interactions, and Natural Production Studies:**

The Service completes Biological Assessments (BA) and Hatchery and Genetic Management Plans (HGMP) to comply with the ESA. These assessments and plans help guide facility operation and production, considering the potential impacts on the biological community.

To comply with the ESA, the Service initiated a BA back in 1993, which described potential impacts to listed Snake River stocks. Since the original BA, more than a dozen additional assessments have been submitted to both NOAA Fisheries and the Service covering the Leavenworth program. Although these BA's were sufficient in detail to satisfy legal requirements, in 1999 a new process was formulated by NOAA Fisheries and the Service which required the drafting of HGMP's. This document, submitted in November 2002 and considered a "phase I draft", describes current operations at the hatchery and will comply with ESA obligations, covering both NOAA Fisheries and Service trust species. The phase I draft was distributed to the co-managers and other interested parties which then served as the focus for the collaborative, phase II part of the process. Collaboration meetings began in early 2003 and were essentially completed in late 2003. The phase II draft plan was provided for the subbasin planning process and the appropriate technical recovery team (TRT) for consideration and interaction with these groups. The phase II draft plans will be set-aside (parked) until all HGMP's relevant to an Evolutionarily Significant Unit (ESU) are completed, allowing for ESU-wide considerations and feedback with the TRT/Recovery Planning process. The HGMP collaborators will incorporate TRT advice as appropriate to ensure consistency with broader recovery objectives. This step culminates in Phase III drafts, which become final and ready to implement after approval by NOAA Fisheries and the Service.

As previously mentioned, of special concern in the Wenatchee River Basin is wild (listed) steelhead, spring Chinook, and bull trout production. Natural production of juvenile, smolt and adult steelhead and spring Chinook is currently monitored by WDFW and Chelan Public Utility District (PUD). The Service is developing study proposals to help assess the effects of unlisted hatchery spring Chinook salmon on the aquatic community in the Wenatchee Drainage. The Olympia FHC is also assessing the status of wild fish health in the Icicle watershed.

Additional monitoring needs have also been identified in the Draft Wenatchee Subbasin Summary. This document is available at the hatchery's administration office.

**Environmental Monitoring:**

Environmental monitoring is conducted at Service facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System permit and is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability for our cooperators to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following parameters are currently monitored at this hatchery.

- Total Suspended Solids (TSS): 1 to 2 times per week on composite effluent, maximum effluent and inflow samples. Once per month on pollution abatement pond inflow and effluent samples.
- Settleable Solids (SS): 1 to 2 times per week on inflow and inflow samples. Once per week on pollution abatement pond inflow and effluent samples.
- In-hatchery water temperatures: minimum and maximum daily.
- In-hatchery Dissolved Oxygen: as required by stream flow or weather conditions.

**Coordination/Communication:**

The hatchery holds HET meetings each spring and fall. These meetings include representatives from Leavenworth NFH, MCRFRO, and OFHC. Topics of concern include reports on current activities and accomplishments, present management programs, and future plans or studies that might effect, or be affected by hatchery operations. Other aspects include survival, life history, fisheries contribution, and fish health parameters at Leavenworth NFH and how it compares to other National Fish Hatcheries producing spring Chinook salmon in the Columbia River Basin.

In the past, HET meetings were attended by Service staff only. In the future, the co-managers and other cooperators may be invited to the meetings, particularly if the issues to be discussed may have an affect on other programs.

**Fish and Egg Transfers:**

All fish and egg requests and transfers are coordinated through Leavenworth NFH, MCRFRO, OFHC, and CRFPO. Any request for fish and/or eggs, either in or out of Leavenworth NFH, will be in writing and a National Fish Hatchery Planned Release or Transfer Schedule will be prepared by the requester. All transfers of fish and/or eggs require a fish health certification from Olympia Fish Health Center. All fish and egg transfers are made in accordance with co-managers fish disease control policy and the Service's fish health policy and implementation guidelines. If the fish and/or eggs are determined to be healthy, the MCRFRO arranges for all appropriate state permits involving the transport. The transfer schedule is signed by the Leavenworth NFH manager and OFHC, which sends the document and permits to the CRFPO for approval. These requests and permits are kept at the hatchery and MCRFRO for future reference.

**Interagency Coordination/Communication:**

As part of the U.S. v Oregon Columbia River Management Plan, the Technical Advisory and Production Advisory Committees are comprised of harvest and production assessment biologists, including representatives from the Service, Tribes, NOAA Fisheries, and states of Oregon, Washington and Idaho. These groups provide management direction used in establishing hatchery fish production goals and harvest rates. MCRFRO participates, as needed, to assist Service personnel participation in these coordination forums.

The Integrated Hatchery Operations Team (IHOT) was comprised of representatives from fish management agencies, including the Service and tribes. IHOT developed a series of regional hatchery policies and operational plans. The IHOT group has since been replaced by the Artificial Production Review process funded by the Northwest Power Planning Council. The Service is represented by our Regional Office staff.

Pacific Northwest Fish Health Protection Committee (PNFHPC) is comprised of representatives from U.S. and Canadian fish management agencies, including OFHC, tribes, universities, and private fish operations. The group meets twice a year to monitor regional fish health policies and to discuss current fish health issues in the Pacific Northwest.

Annually, each October, the Leavenworth NFH Complex sponsors a Hatchery Management Workshop in the Tri-Cities area of Washington State. While this workshop focuses primarily on FWS hatcheries in the Columbia Basin, other entities (including tribes) frequently attend and give presentations/participate in discussions.

On an annual basis, usually in February, the Service hosts a coordination meeting with the Yakama Tribe in Yakama, Washington. Information presented covers FWS hatchery programs and updates are presented by the tribe concerning their programs. This coordination meeting has been praised by the YN as a great means to communicate and share information.

**Ocean Fisheries Management:**

Leavenworth NFH spring Chinook salmon are not recovered in ocean fisheries in significant numbers and do not influence ocean fishery management decisions.

**Freshwater Fisheries Management:**

Washington, Oregon, and the four treaty tribes (Yakama, Warm Springs, Umatilla and Nez Perce), that are parties to the Columbia River Fish Management Plan (US v Oregon), prepare harvest strategies based on run size predictions made by their respective fishery agencies. They then jointly present their findings to the Columbia River Compact through the Technical Advisory Committee (TAC). The Columbia River Compact, created by congress, has the authority to approve or reject sport and commercial fishery proposals for the mainstem Columbia River. In their deliberations, the Compact will consider the findings of the TAC. If those findings are in compliance with the management plan, brood stock goals and ESA guidelines, and the run size prediction



shows a harvestable surplus, the Compact will set seasons for non-tribal and/or tribal fisheries in the mainstem Columbia River.

If a harvestable surplus is predicted for Icicle Creek, the State of Washington and Yakama Nation will set regulations for terminal area non-tribal sport and/or tribal subsistence fisheries. Fishing regulations are established to also provide adequate escapement for hatchery production and meet ESA guidelines.

### **3.9 Public Outreach Activities**

The Leavenworth National Fish Hatchery Complex houses one of the most comprehensive Information and Education Outreach Departments (I&E) in the National Fish Hatchery System. Serving Leavenworth, Entiat and Winthrop National Fish Hatcheries, this department is managed by an Outreach/Public Affairs Supervisor and staffed with an Environmental Education Specialist, Interpretive Specialist/Friends Group liaison and Information Receptionist. The I&E department shares and distributes its time and staffing between the three stations and serves many partners in both the private sector, schools, tribes and multiple local, city, state and federal government agencies. Funding for the I&E program comes from the Complex budget and is supplemented by financial support from fundraisers, local community contributors, sponsors, and grants raised and managed by the Friends of Northwest Hatcheries.

The goal of the Leavenworth Complex I&E Office outreach program is to increase the visibility of Fish and Wildlife Service hatcheries in eastern Washington State and to provide information about FWS programs to both internal and external audiences. FWS staff and volunteers show how FWS programs benefit the public and the environment in keeping with the FWS mission, “to conserve, protect, and enhance the Nation’s fish and wildlife and their habitats for the continuing benefit of people.”

Recognizing that it is increasingly important for all FWS staff to be involved in gaining or retaining public support for agency programs, the I&E program strives to insure that staff is well-informed about policies, procedures, and issues; and that staff are willing and able to interact with our various publics. Program directives include providing current information and natural resource education to staff, partners, stakeholders, school teachers, students and volunteers. Outreach to community members and a diverse public is critical. The program focus is to use current communication techniques and interactive inter-disciplinary outdoor education as a management tool to support the health and survival of our hatcheries and the Service as a leader in natural resource conservation.

An estimated 150,000 guests visit Leavenworth NFH annually. These visitors come from all walks of life, diverse backgrounds and ages and are documented from hatchery tour records, tour bus companies, guest book registrations, special events and walk-ins. Our visiting public has become much more educated about natural resources. Many visitors and tour groups want an in-depth visit to the hatcheries in our Complex. The challenge faced by the I&E Department is to maintain quality interpretive and educational messages that stimulate thinking and conversation on all aspects of salmon issues. Hatchery tours

are custom-made per group and include natural resource interactive games, interpretive trail walks, fish viewing, hands-on projects and more.

**On Station:** I&E activities held on station include guided and self-guided tours. We serve schools from throughout north central Washington, primarily from the Wenatchee Valley. Many tours are conducted for adult groups including Elderhostel, tour bus companies, community school and several special interest groups. Thousands of individuals and families, business groups and hotel/motel visitors enjoy the self-guided approach that the hatchery offers by way of a brochure and on-the-ground signing. Primarily, these audiences are seeking answers to questions concerning water use, history of Leavenworth NFH, hatchery operations, Native American fishing, and other contemporary salmon issues.

A visitor center was built at Leavenworth NFH in 2002, which accommodates and provides stimulating information on all aspects of the salmon life-cycle and migration challenges. This is accomplished both artistically, with a mural, photos and graphics, and in text form signing. Other on-site educational efforts include special environmental education curriculum and activities such as Outdoor School for sixth graders, college natural resource and special event marketing classes, high school Kids-in-the-Creek program, 4-H Washington State University Forestry student program, elementary after-school classes, high school biology class programs, pre-school tours and more. The outreach efforts focus on a broad-based approach to natural resource education. The hatchery ground lends itself well as an outdoor classroom. Many partnership and recreational special uses offer more on-site opportunities including the Icicle Creek Interpretive Nature Trail walks, bird watching and horseback riding. The Hatchery is home to the Cascade Discovery High School, an alternative high school of Leavenworth's Cascade School District. Hatchery staff mentors these 10<sup>th</sup> through 12<sup>th</sup> grade students in a variety of professional ways. The students work with Fish Production, Maintenance, and I&E department on special projects that enhance their learning requirements. The Wenatchee River Salmon Festival is the largest special event Leavenworth NFH hosts annually, each September. This multi-partnered event runs four full days, with the first two days as the scheduled School Days (2,500 school students in attendance) with the general public days falling on the weekend. This award winning festival has become the model of many nature festivals throughout the United States with its goals lying in quality natural resource education, promoting outdoor recreation, sharing the cultural significance of salmon to the people of the northwest and helping to boost the tourism economy for the City of Leavenworth. More than 10,000 people attend the festival and experience interactive learning activities, nature exhibits, art and music, salmon and watershed lessons, Native American living encampment, "edu-tainment", hatchery tours and many recreational activities.

Leavenworth's Friends of Northwest Hatcheries non-profit group (Friends') also hosts events on site such as Arbor Day and open houses. A handicapped fishing day is held in October each year.

Many opportunities for the community to visit the hatchery exist through major use partnerships with the Leavenworth Summer Theater and the Leavenworth Winter Sports Club. Both organizations bring many thousands of people to the hatchery for summer plays and cross-country skiing, respectively. The I&E department also leads Winter Life Snowshoe tours in January and February taking visitors on snowshoe walks on the grounds looking at winter wildlife and habitat.

**Off station:** Outreach efforts include an array of activities that occur throughout north central Washington State. The Outreach program provides counsel and fills requests for environmental education curriculum, interpretive materials and partnership building for all hatcheries in the region. National Fishing week is co-celebrated with Trout Unlimited hosting a kids fishing derby in May. The I&E staff travel to other special festivals and events throughout eastern Washington assisting the Columbia National Wildlife Refuge, Spring Creek National Fish Hatchery, the Wenatchee and Okanogan National Forests, Chelan County Conservation District and Chelan PUD. The hatchery loans it's Salmon Maze, Fin Bins and other natural resource education trunks, Sammy Salmon mascot costume, Salmon Festival curriculum and more throughout the year.

The Leavenworth NFH participates in the annual "Expanding Your Horizons" conference at Central Washington University. The I&E department participates in career fairs, National Interpretive and Environmental Education Associations' conferences and seminars, serves as guest presenters for agency and non-agency outreach conferences, hatchery managers' conferences, media seminars, and professional festival planning conventions. The hatchery is also involved, both on site and off site, with the production of the annual Leavenworth Spring Bird Festival held in conjunction with International Migratory Bird Day. Public meetings held by the hatchery staff take place off site in Leavenworth venues within the school district and local hotels/motels.

Educator workshops are a priority for the Leavenworth Hatchery I&E program. Three workshops are held for the more than 80 teachers attending the Salmon Festival with their classrooms. This mandatory workshop is co-hosted with the Forest Service. Other teacher workshops such as Project WET, Project WILD, and others are presented off site throughout the year.

A bulleted list of partnerships and cooperators follows.

**Partnerships/Cooperators with Leavenworth National Fish Hatchery:**

- U.S. Forest Service- Wenatchee and Okanogan National Forests
- Friends of Northwest Hatcheries
- Icicle Creek Watershed Council
- Chelan County Conservation District
- Chelan County PUD
- Bureau of Reclamation
- Army Corps of Engineers
- Cascade School District
- Colville Confederated Tribes

- Yakama Indian Nation
- Trout Unlimited
- Washington State Department of Fish & Wildlife
- Bonneville Power Administration
- Washington Festivals and Events Association
- Leavenworth Chamber of Commerce
- City of Leavenworth
- Cashmere School District
- Leavenworth Summer Theater
- Leavenworth Winter Sports Club
- Icicle Outfitters and Guides
- Icicle-Peshastin Irrigation District
- Cascade Irrigation District
- Washington State University 4H Forestry Education Program
- One Reel Productions and I Am Salmon
- Audubon
- Chelan-Douglas Land Trust
- Central Washington Regional Museum
- Congressman Doc Hastings and staff representatives
- Media partners include the Leavenworth Echo, Wenatchee World, Koho and KPQ Radio
- North Central Washington Educational Service District
- Chelan County Sheriff's Department
- Chelan County Fire Department
- McDee's Art

These agencies, organizations, schools and businesses provide invaluable support for special event and education program planning and implementation. Partnerships are imperative and are integrated into every outreach project, activity or program held.

### **3.10 Special Concerns**

#### **Planning Issues:**

Several federal, state and tribal entities share responsibilities for development of subbasin/watershed plans, hatchery production, harvest management, and ESA considerations. Recent actions have centered on identifying and correcting factors contributing to the decline of the Wenatchee River basin's aquatic resources. The agencies involved include the U.S. Forest Service, U.S. Fish and Wildlife Service, NOAA Fisheries, Geological Survey, Bonneville Power Administration, the Washington Department of Fish and Wildlife, and the Yakama Nation. Private land owners, the public, and watershed groups play an important role in managing Icicle Creek and the Wenatchee River watershed.

These plans will recognize and comply with all management plans and Biological Opinions affecting the Columbia River Basin in general and the Wenatchee Basin. Operations at Leavenworth NFH contribute to a number of potential issues in the

watershed. The primary issues center around marking, water use, juvenile distribution and production numbers, surplus adult distribution, impacts to listed and other aquatic resources, and actions being taken to help recover listed and depressed populations. Implementation of these plans has the potential to alter Leavenworth NFH production programs and operations.

**Marking:**

To help protect wild and naturally produced fish, the states of Washington, Oregon and Idaho are implementing selective sport and commercial fisheries (non-tribal) on marked hatchery fish. This selective fisheries management strategy requires that all hatchery produced fish targeted for harvest be mass marked. Mass marking of hatchery fish is being implemented in the Columbia Basin for steelhead and coho salmon and most recently for spring Chinook salmon. Mass marking of fall Chinook salmon has not yet been implemented because of technical, logistic, and funding limitations, except for special cases.

Tribal managers generally disagree with the management strategy for mass marking and selective fisheries.

The Service has not made any unilateral decisions on marking but has undertaken actions to comply with ESA Biological Opinions. The Service will continue to coordinate actions with the states and tribes through US v Oregon and NOAA Fisheries to comply with ESA actions and coordinate with PSMFC mark committee. In addition, the federal agencies are beginning discussion of a comprehensive marking strategy for the Columbia River Basin as identified by Action 174-1 in the Federal Columbia River Power System Biological Opinion. The federal agencies (NOAA Fisheries lead) are meeting with the states and tribes to begin this effort.

This Comprehensive Marking Plan should:

1. Improve our ability to assess and monitor the status of naturally-producing (especially ESA listed) populations.
2. Monitor and evaluate hatchery programs, including hatchery reforms and stray rates.
3. Maintain critical harvest management and stock assessment information.
4. Monitor mark-selective fishery regimes established by the states.
5. Improve regional and watershed based marking decisions.
6. Be consistent with recovery plan goals.
7. Be coordinated through US v Oregon, PSMFC and U.S. forums.

**Water (Drought):**

In the rare event of a severe drought condition and/or declining well water levels, part or all of production fish would be released rather than allowing them to die in the ponds. The number of fish released would be determined according to the amount of water available.

**Surplus Adult Salmon Distribution:**

In most years more fish return to the hatchery than are needed for brood stock. Most of these surplus fish are still in very good condition and are distributed to the Bureau of Indian Affairs for distribution to various tribes for Ceremonial and Subsistence use. Periodically, the local Trout Unlimited group will receive excess fish via a national agreement with the Service. Surplus fish or spawned males only can be used for stream enrichment. Females injected with erythromycin cannot be used. Erythromycin has not been cleared for use on food fish by the Federal Drug Administration; therefore, carcasses previously injected with erythromycin cannot be used for human consumption and must be buried on site. In accordance with the Pacific Northwest Fish Health Protection Committee draft Salmon and Steelhead Carcass Distribution Protocols, pre-spawn mortalities cannot be used for stream enrichment and must be buried on site.

**Fish passage and Ladder Management:**

Adult spring Chinook return to the hatchery from May through July. Years where large adult returns are expected, the fish ladder is opened and closed periodically. This strategy allows additional harvest by sport and tribal fishers and moreover reduces many hours handling excess fish by hatchery personnel. Current plans are to provide passage beyond the hatchery barrier by 2006, for species other than hatchery spring Chinook salmon.

**Icicle Creek Restoration Project:**

The original design of the Leavenworth National Fish Hatchery, built between 1939 and 1941, involved diverting the majority of Icicle Creek's flow through a canal with an energy control dam at the base and construction of holding dams and weirs in the historic creek channel. Migration of endangered steelhead, threatened bull trout, and many other fish species are affected. To address this issue the USFWS in cooperation with the USFS and Bureau of Reclamation identified and partially implemented a proposed action, the Icicle Creek Restoration Project. The Icicle Creek Restoration Project was separated into two phases. Phase I was implemented and completed in 2003. Phase I included removal of Structure 2 except the headgate and removal of all of Structures 3 and 4.

Implementation of Phase II is pending completion of permitting requirements. Phase II will include: (1) rehabilitation, mechanical and structural, of the headgate at Structure 2; (2) construction of a vertical slot fishway at the headgate to provide fish passage; (3) modification of Structure 5 to incorporate a seasonal fish barrier with a sorting facility and bypass structures; (4) rehabilitation of existing parts of Structure 5 including the bridge; (5) increasing stream flows in the historic channel up to a maximum of 2,400 cfs; and (6) natural flushing of sediments within the historic channel. With the completion of Phase II of the Icicle Creek Restoration Project, upstream and downstream fish passage through the LNFH will be provided year-round for native fish species.

**LNFH'S Water Supply System Rehabilitation Project:**

The purpose of the LNFH's Water Supply System Rehabilitation Project is to provide year-round fish passage past the low head dam at its gravity intake facility through the

construction of a roughened channel; replace the fish screens at the intake's point of diversion with Coanda screens designed through consultation with NOAA Fisheries; and replace structural components of the gravity intake facility and water delivery system that are degraded and failing. These proposed actions will only affect structural components of the gravity intake facility on Icicle Creek. The structural components of the Snow Lake supplementation water supply project and the well system on hatchery property will not be changed. LNFH recognizes that baseline flow conditions, which include operation of four water withdrawal systems within Icicle Creek, may not provide adequate stream conditions for fish during August and September from river mile 2.8 to 4.5. The hatchery has voluntarily included a pump-back system component to its proposed project. The pump-back system will allow the hatchery to return up to 20 cfs of water to Icicle Creek at river mile 4.5. The hatchery also has the option to use its Snow Lake supplementation water supply and well system to alleviate low flow conditions in Icicle Creek (rm 2.8 to 4.5). These three systems will be operated, within current water rights and with the primary goal of meeting production responsibilities, to supplement flows in Icicle Creek during August and September. Additional water will be added to ensure that flows between rm 4.5 and 2.8 do not fall below 20 cfs. Implementation of the Water Supply System Rehabilitation Project is pending completion of permitting requirements.

## CHAPTER 4: IMPLEMENTATION

Implementation of the Leavenworth NFH program requires input to reimbursable and Service budget processes, as well as compliance with Service policies, legal mandates, and other environmental and human resource laws. This chapter intends to outline these processes and discuss the policy and planning documents which provide guidance to Leavenworth NFH in regards to policy, budget, safety, grounds and facilities maintenance.

### 4.1 Budget Overview

Leavenworth National Fish Hatchery receives 100% of its operations budget from reimbursable Bureau of Reclamation (BOR) funds. The funds are administered through the Leavenworth National Fish Hatchery Complex. The Service has a funding agreement with the BOR covering operation and maintenance costs for the Complex as required mitigation for adverse impacts to fish due to the construction of Grand Coulee Dam. Operation budget needs are identified each year and negotiated with BOR (Grand Coulee) to determine the final fiscal year allocation. Deferred maintenance and most construction funding is identified and covered through the reimbursable funding agreement. Some funding for special safety and engineering projects are derived from Service funds. Current budget and number of full-time personnel for Leavenworth NFH are provided in Attachment 15. In past years, a portion of operational funds did come from the Service. However, those funds are now directed to stations where the Service has the primary funding responsibility. Hatchery evaluation program funding also is provided by the BOR through MCRFRO activities.

**Budgetary Needs and Strategies:** Leavenworth NFH construction project needs are identified through the Bureau of Reclamation's construction project activity plans, otherwise known as the RAX system. Projects are additionally identified through the Service's Maintenance Management System (MMS), and the Fisheries Operational Needs System (FONS). Access to FONS and MMS files is through the Fisheries Information System (FIS) database. The FIS database consists of five modules which address out-year budgeting (FONS), resource oriented accomplishments that occurred over a fiscal year (Accomplishments Module), Congressionally mandated reporting requirements that describe yearly production at NFH's (Fish and Egg Module), activities related to endangered species (Imperiled Species Module), and deferred maintenance needs (Maintenance Management System).

**Fisheries Operational Needs System (FONS):** The FONS was established in 1999 as a planning, budgeting, and communication tool to enhance identification of funding and staffing needs for the fishery program. FONS projects are used in budget requests to the Department of Interior and the Office of Management and Budget. Attachment 16 outlines the Regional and National budget formulation, and provides a time step through the process.



**Maintenance Management System (MMS):** The Maintenance Management System is a national inventory of deferred Service maintenance projects. Deferred maintenance projects are those that can be delayed or do not occur on an annual basis. For most Service owned facilities, the MMS is the primary vehicle used to address maintenance requirements above \$5,000. The database is updated annually, and then forwarded to the Washington Office (WO) for consolidation and submission into the budgetary process. For Leavenworth NFH, the primary vehicle used to address maintenance requirements above \$5,000 is the Bureau's RAX system. Thus, projects submitted to the MMS for consideration have been reduced in recent years, as the majority of projects are primarily identified and funded through the RAX system.

**RAX System:** The RAX is the BOR's maintenance and construction project database, and is the BOR's equivalent to the MMS. Projects are identified in activity plan worksheets and submitted to the BOR-Grand Coulee on an annual basis. Projects in the system can also be updated with annual worksheet revisions. The RAX system covers immediate construction needs and out-year construction projects.

**Five-Year Construction Plan:** Fisheries Construction projects are entered into the RMIS, the same web-based database developed for Refuges, as is used for the RPI. Scores and Regional priorities are assigned and the information is used in the WO to develop the Five-year Construction Plan. This plan, after it has been approved by the Department and OMB, is submitted as part of the Service Budget to Congress. The out-years of this plan are subject to revision each year.

Construction funds are similar to MMS funds, but are reserved for new construction and maintenance to existing buildings above \$500,000.

**Five-Year Maintenance Plan:** The Deferred Maintenance projects entered into the database are prioritized by the WO, at least partially, based on the priority established by the Field Office and Regional Office priorities. This plan is reviewed by the Department and the approved plan is part of the basis of our MMS budget request to Congress (see previous discussion on MMS).

**Historic Preservation Integrated with Maintenance Plan:** Maintenance of the historic buildings and structures identified on the Leavenworth NFH station will follow guidance provided by the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. These guidelines provide information for preserving, rehabilitating, restoring and reconstructing historic buildings. Other guidance published by the National Park Service includes the *Preservation Briefs* series which provide guidance to issues concerning the historic character of buildings such as, "Roofing for Historic Buildings," "Repair and Upgrade of Steel Sash Windows," "New Exterior Additions to Historic Buildings," "Preservation of Historic Concrete," "Heating, Ventilating, and Cooling Historic Buildings," "Mothballing Historic Buildings," and "Seismic Retrofit for Historic Buildings," among others. The *Secretary's Standards* along with all of the *Preservation Briefs* are available on-line at: [www.cr.nps.gov/hps/tps/briefs/presbhom.htm](http://www.cr.nps.gov/hps/tps/briefs/presbhom.htm).

A process is in-place for all maintenance projects at Leavenworth NFH. Maintenance, updating, remodeling, or constructing new facilities will be reviewed by the Region 1, Cultural Resources Team (CRT) in order to ensure consistency with the *Secretary's Standards*. The CRT will be available to answer questions regarding the Standards and provide recommendations for sensitive rehabilitation and preservation of the historic character of the buildings and structures. For instance, the recent seismic retrofit project of the hatchery building, shop, and residences was reviewed by the CRT for consistency with the *Secretary's Standards* and other preservation guidance. Following the *Secretary's Standards* and consulting with the CRT for projects that may potentially alter the character of a historic building are necessary for complying with the NHPA. See below Section 4.2 for specific recommendations for each of the primary buildings.

**ESA Compliance and Needs:** The 2002 NOAA Fisheries Biological Opinion on Artificial Propagation in the Columbia River Basin lists a host of measures which either must, in the case of Reasonable and Prudent Alternatives, be complied with or, in the case of Conservation Recommendations, should be implemented (NMFS 1999b). Several actions require additional resources. Two of the Conservation Recommendations (CR) discussed below have been implemented at Leavenworth National Fish Hatchery.

CR12 Implement programs to apply a cost-effective, externally distinguishable mark to all hatchery fish released in the Columbia River Basin. This measure should assist the action agencies in minimizing adverse effects, and assist NOAA Fisheries in evaluating the effects of hatchery programs on listed and unlisted salmon and steelhead.

CR14. Adopt management strategies to separate returning fish from listed naturally spawning fish through such measures as releasing hatchery fish outside primary natural fish spawning and rearing areas and removing hatchery fish at weirs.

Additional Conservation Recommendations are: minimize inter-basin stock transfers, emphasize juveniles that are ready to migrate to the ocean and spend a minimum amount of time in the freshwater environment; improve homing and reduce straying; assess carrying capacity and density-dependent effects (unfunded); monitor and evaluate predation (unfunded); conduct spawning ground surveys; assess use of hatchery carcasses for nutrient input (needs development); use most appropriate brood stock for reintroduction into historic or vacant habitats; develop cost-effective externally distinguishable marks to identify hatchery origin fish; modify hatchery programs to conservation/enhancement role (to be identified in HGMP); adopt strategies to separate returning hatchery fish from listed naturally spawning fish; continue adaptive management to improve smolt quality; and continue to coordinate hatchery programs to meet ESA concerns. In addition, a host of measures are associated with an Incidental Take Statement. Reasonable and Prudent Measures are: provide projected hatchery releases to NOAA Fisheries annually; manage programs to minimize potential inbreeding of hatchery and listed fish; monitor and evaluate artificial propagation programs (partially funded); reduce potential negative impacts to listed salmon and steelhead from hatchery operations; and conduct the proposed actions in such a way as to minimize adverse

genetic and demographic effects on naturally-produced listed steelhead (to be identified in HGMP). Terms and Conditions include: provide to NOAA Fisheries projected hatchery releases and annual report of releases and returns; mark a representative sample of hatchery salmon and steelhead released to allow M&E (partially funded); develop protocols for fishery augmentation/mitigation programs to reduce potential for interbreeding and genetic introgression (to be identified in HGMP); insure water intakes are properly screened and comply with NOAA Fisheries intake structure criteria (unfunded); implement PNFHPC and IHOT guidelines; monitor effluent for compliance with NPDES permits, and shall minimize the number of hatchery adults remaining to potentially spawn with wild fish through removal of hatchery fish at sufficiently high harvest and/or trapping.

## **4.2 Service and Station Guidance**

Each Service hatchery operates under a variety of guidance and policies. This section is provided to describe some of the more important policy and guidance documents that are available at the hatchery.

**Quarters Policy:** The Service administers a variety of field offices and National Fish Hatcheries. At many of these hatcheries, including Leavenworth NFH, government owned residences are available to employees on a required occupancy basis. The determination of whether an employee must occupy government furnished quarters as a condition of employment is made on a station-by-station, position-by-position basis. In making a determination, supervisors will consider: the dependability of the water supply, adequacy of the alarm and call back systems, response time needed to take emergency corrective actions, and the adequacy of the security provided to protect fish, facilities, and equipment. Priority for government quarters occupancy will go to those required to occupy on-station housing as a condition of employment. The current quarter's policy is being revised.

**Required On-Station Housing:** The intent of having personnel living in government quarters at Leavenworth NFH, is to provide station security and operations during non-duty hours. Mechanical systems to regulate water flows must be maintained immediately to prevent loss of valuable fish stocks. Additional security protection of government owned property is provided by occupants especially when anadromous brood stock is present.

**Overtime/Compensatory Time/Standby:** Regulations governing overtime, compensatory time, and standby are described in the U. S. Fish and Wildlife Service Administrative Manual. Premium pay is discussed in Part 225 FW of the Manual with specific discussions on overtime regulations in Chapter 7.8, callback overtime in Chapter 7.13, Compensatory time in Chapter 7.18, and standby in Chapter 7.22.

**Distribution of Surplus Fish/Eggs:** Guidance was provided in a July 2001 memorandum from the Regional Director (Attachment 17). The guidance states: "Live fish entering a National Fish Hatchery (Hatchery), whole fish carcasses or their parts, are

Government property and cannot be converted for personal use, even temporarily on loan. Misuse of Government property may result in disciplinary action ranging from a written reprimand to removal from the Service. The attached Standards of Ethical Conduct for Employees of the Executive Branch, contained in 5 CFR 2635.704, specifically address use of Government property.

It is important to first consider all possible uses of hatchery fish that are consistent with the Service Mission. Surplus fish must be disposed of using prescribed government contracting procedures. Furthermore, you must comply with other Service and FDA policies related to the disposition of carcasses and parts that have been treated with chemicals making them unfit for human consumption.

**Drugs and Anesthetics:** Guidance on the use of anesthetics, drugs and other chemicals was provided in a November 9, 2000 memorandum from the Assistant Regional Director for Fisheries in Region 1 (Attachment 18). Hatcheries and other Fisheries offices within Region 1 may at times have legitimate and necessary reasons to use certain drugs and chemicals to achieve their goals and complete the mission and objectives of the Service. During the capture, rearing or monitoring of fish species, several drugs and chemicals are used for anesthesia, disease treatments, or to increase the survival of the animals. Some of these compounds are already registered and labeled for fisheries use. Others may be legally used under the prescription and supervision of a veterinarian, or within the protocols of an existing INAD exemption permit issued by the Food and Drug Administration (FDA). The Service has existing correspondence from the FDA concerning the use of compounds in the recovery of threatened and endangered species, but there are strict considerations and limits even in those situations. Region 1, working closely with the National INAD Office and through appropriate consultation with FDA, will fully comply with all regulations and agreements for the use of aquatic drugs and chemicals. The inappropriate use of compounds on fish or aquatic animals intended for human or animal consumption is prohibited.

**Employee Training:** Regulations governing employee training are described in the U. S. Fish and Wildlife Service Administrative Manual. Career development is discussed in Part 230 FW of the Manual.

**Specific Historic Preservation and Maintenance Guidance:** This section presents specific recommendations for each of the primary historic buildings at the hatchery.

Hatchery Building: Exterior -- maintain façade in its current appearance, preserve the original steel-frame windows, continue to repair concrete walls. Interior – most of the interior office areas have been updated and are not visited by the public so there is no specific guidance necessary. The only interior area that includes original features is the hatchery trough room. An interesting feature of the hatchery operations is the control panel with alarm buttons that is part of the original electrical system, the control panel is no longer functional, but its retention is recommended. The second floor, floating deck and storage area is original and should be maintained in its current appearance. The hatchery building was seismically upgraded in 2003.

Shop: Exterior – maintain façade in its current appearance, preserve the original steel-frame windows, continue to repair the concrete walls. The garage bay doors have been replaced several times, the goal is to keep them functional and blend with the building style. Interior – the interior room arrangement is intact and should be maintained. Key features of the interior are the blacksmith shop with the forge, forge hood, and machinery. The machinery, some of which is no longer in use, is original and was used to manufacture some of the metal work at the hatchery. Specifically: 20” engine lathe AXELSON, of Los Angeles, Calif. (patent #2265502) and General Electric motor Serial # 5K324D1892. The carpentry shop area also has a couple pieces of equipment that date to the early days of the hatchery and should be retained. On the rear of the building are vehicle bays and in one is an oil rack and pit. The oil rack and pit should be maintained in its current condition. The interior walls are unpainted hollow clay tile and these should be preserved as-is. The shop building was seismically upgraded in 2003.

Refrigeration Building: Exterior – maintain façade in its current appearance, preserve the original steel-frame windows, continue to repair the concrete walls. Interior – the interior room arrangement is fairly intact and should be maintained. Key features of the interior are the loading dock, refrigeration storage units and the wooden refrigerator doors. The interior office/lab area can be updated as needed for continued use. The refrigeration building was seismically upgraded in 2003.

Quarters: Exterior – the residences are simply adorned wood clad buildings with metal pipe porch railings. The wood siding is a unique wide rustic beaded board which is no longer commercially available. Siding will need to be specially ordered to match the existing. Any replacement of siding should be confined to extremely deteriorated boards and replaced with an exact match. It is highly recommended that a source for duplicating the boards be identified and a supply of boards milled and stored for use as needed. The small concrete front porch with metal pipe railing should be maintained in its current appearance. The roof and windows have been altered. Retaining the original window size and configuration or returning to a more historic appearance of window sash is recommended. Interior – the interior of the houses have been updated and remodeled quite extensively. It is important for the buildings to continue to be used and minor updates are expected. The buildings were seismically upgraded in 2003.

Foster-Lucas Ponds: A primary characteristic of the Leavenworth hatchery station is the banks of Foster-Lucas Ponds. While the large ponds are not currently capable of rearing fish on a production level, they do provide a landscape level link to the gigantic scale upon which Leavenworth was designed and built. It is recommended that at least one bank of the large and small F-L ponds is retained to illustrate this important element of the hatchery’s history. One pond in the first bank of large F-L ponds is being used as a fish habitat viewing area. The small F-L ponds are used intermittently.

Canal, Headgate, spillway, bridge: The Icicle Creek diversion canal is a large-scale engineering project and should be maintained in its current use and condition. Repairs to

the steel bridge, spillway, and headgate should maintain their historic appearance and follow the *Secretary's Standards*.

Other hatchery features: The Snow Lake Tunnel and valve are unique features of the hatchery and should be maintained in their current function. The screen chamber and well #1 are part of the original water control system and should be maintained or mothballed if no longer in use.

Water Intake System: The water intake system is not a contributing element to the hatchery and is not a historic property, so maintenance or replacement is not mandated to follow the Secretary's Standards.

Wells, pump houses, and pipes: Controlling water flow, temperature, and clarity are all important elements of hatchery operations but the above ground expressions of these functions change rapidly and are not considered to be historic properties.

### **4.3 Service Required Planning Documents**

Daily operations of Leavenworth NFH are guided by a number of plans and reports designed to promote health and safety, station development, emergency situations, employee training, and other actions. Some of the more significant ones are described in the following section:

**Safety and Health Plan:** Safety regulations are described in the U. S. Fish and Wildlife Service Administrative Manual. Safety program discussions start in Part 240 FW of the Manual.

**Fire Management Plan:** Department and Service policy require that “every area with burnable vegetation must have an approved Fire Management Plan” and field stations cannot conduct prescribed fire operations, including trash burning, without an approved Fire Management Plan that includes such activities. All Service facilities developed plans and had them approved in FY2001, but they must be amended before any controlled burning can be conducted.

**Integrated Pesticide Management Plan:** It is Service policy to eliminate unnecessary use of pesticides by implementing integrated pest management techniques and by selecting crops and other vegetation that are beneficial to fish and wildlife but do not require pesticides. The ultimate goal is to eliminate pesticide use on Service lands and facilities and to encourage pest management programs that benefit trust resources and provide long-term, environmentally sound solutions to pest management problems on non-Service lands (Attachment 19).

When pesticides are used, they must be part of a pest management program that includes strategies to reduce and eventually eliminate their use. The program must be set forth in an Integrated Pest Management Plan which must include consideration of target specificity of the pesticide (insecticide, fungicide, herbicide, etc.), risk to non-target

organisms, incidental reduction of food resources for trust species, persistence, control and prevention of the spread of fish and wildlife diseases, and other environmental hazards.

**Station Development Plan:** The Station Development Plan considers future growth and construction needs of the facility that are necessary to meet goals and objectives. The plan is an opportunity to work with the Service's Engineering Department to thoughtfully lay out a course of action to maintain the facility in proper operating condition. It is also a necessary precursor to get construction projects on the five-year construction list (see previous discussion).

Station Development Plans were completed for many stations in the early to mid-80s. Most are in need of revision and 1 to 3 stations will be updated each year as funds and personnel availability allow. The Leavenworth NFH Station Development Plan was written in 1986. A new plan needs to be written to include new and much needed station improvements. For example, the intake, pipeline and screens are planned to be replaced in 2005, and 2006. This is major construction and a total upgrade to station operations, and keeps the facility current with ESA regulations and fish screening criteria.

**Monitoring and Evaluation Plan:** Monitoring and evaluation of production programs are outlined in Hatchery and Genetic Management Plans which can be found at the hatchery, the Mid-Columbia River Fishery Resource Office, or through the Fishery Program Office in Portland. A more detailed discussion of this plan can be found in Chapter 3.

**Distribution of Surplus Fish:** The Leavenworth NFH staff work cooperatively with the Service's Columbia River Fishery Program Office, Mid-Columbia River Fishery Resource Office, Olympia Fish Health Center, and co-managers to plan beneficial uses of fish surplus to hatchery needs in years of large adult returns. The plan considers all possible uses of adult carcasses and live fish in excess of hatchery needs, and is coordinated with co-managers when necessary to achieve mutual goals. A plan should be developed in years where surpluses are anticipated, and should be developed well in advance of spawning operations. These plans can be obtained from the hatchery, the Columbia River Fisheries Program Office (Vancouver, Washington), or through the Fishery Program Office in Portland.

**Small Water Systems Management Plan (Drinking Water):** The Safe Drinking Water Act (SDWA) delegate's safe drinking water control to the states. FWS must meet state requirements to provide drinking water to the public as well as our employees and their families. The EPA recently indicated that they believe that a significant number of the Service's systems do not fully comply with the SDWA. The Leavenworth NFH drinking water supply for the public and employees is fully compliant with both state and Federal standards. The hatchery facility and government quarters are on the City of Leavenworth water supply system. The city is required to provide water compliant with State and Federal regulations and the Safe Drinking Water Act.

**Continuity of Operation Plan:** The continuity of Operations Plan provides guidance for Leavenworth NFH staff to ensure that essential operations and activities continue during and after an emergency situation. The plan is developed in accordance with DOI, MRPS Bulletin 98-01, Continuity of Operations Planning - Guidance and Schedules, dated March 27, 1998, and 380 DM 6, Vital Records Program. This plan was updated in December, 2003 and is located at the hatchery in the administrative files.

**Spill Prevention, Control and Counter Measure Plan:** A Spill Prevention, Control, and Countermeasure Plan (SPCC) is prepared in accordance with the provisions of Title 40 of the Code of Federal Regulations, Part 112. An SPCC plan establishes procedures, methods, and equipment used at the Leavenworth hatchery to comply with U. S. Environmental Protection Agency oil spill prevention control and countermeasures standards, and inspection reporting, training and record keeping requirements. An SPCC is required at Leavenworth NFH because it stores petroleum fuel in above ground storage tanks greater than 660 gallons. The SPCC for Leavenworth NFH is current and is available in the hatchery administrative files.

**Outreach Plan:** An outreach plan (see Chapter 3) details the hatchery's strategy for describing the Service', Leavenworth NFH's, and the Columbia River Basin's resource history to the public. Further, this plan describes outreach tools and facilities needed to implement this strategy. The plan should be cited when describing unmet outreach needs in the FONS database (see Fish and Wildlife Service Budgeting Process).

**Watershed/Sub-basin Plan:** These documents are part of the Northwest Power Planning Council's process to address fisheries and aquatic issues related to subbasin and recovery planning in the Columbia River basin and in facilitating implementation of recovery actions.

National attention has focused on the Columbia River basin with listings of salmon and steelhead, bull trout and other aquatic species. Endangered Species Act consultations and recovery planning for listed species are having a major impact on management of fishery resources, the economy, and cultural values in the basin. Consultations include the operation of the Federal Columbia River Power System, hatchery operations, harvest actions, habitat planning, and project specific activities. Planning processes include the development of an All-H Paper which is a conceptual recovery plan for salmon, steelhead and other aquatic species in the Columbia River basin, and various state and local government recovery planning efforts in Washington, Oregon, Idaho and Montana. The Pacific Northwest Electric Power Planning and Conservation Act resulted in the establishment of the Northwest Power Planning Council and ultimately the development of its Columbia Basin Fish and Wildlife Program, a comprehensive program to enhance and restore the salmon and steelhead runs and other fish and wildlife resources of the Columbia River basin. The Northwest Power Planning Council is leading a major subbasin assessment and planning effort which will provide key building blocks for aquatic species restoration in the basin. At the same time, the Service has initiated recovery planning for bull trout and NOAA Fisheries for salmon and steelhead. Each of these recovery plans will rely on subbasin planning as major building blocks for recovery



of listed species. In addition, Implementation Plans have been developed by the Corps of Engineers, Bonneville Power Administration, and the Bureau of Reclamation that require implementation of significant habitat actions for listed salmon.

There are over 30 different agencies, Indian tribes, councils or commissions with fisheries responsibilities or interests operating in the Columbia River basin. The effective management and restoration of Columbia River basin salmon and steelhead and other aquatic resources depends to a large extent on the ability of these agencies to communicate effectively, resolve differences, develop unified subbasin plans, and work together in a spirit of cooperation in various interagency forums to solve regional and river basin problems.

**National Pollution Discharge Elimination System:** Leavenworth NFH is currently in compliance with the National Pollution Discharge Elimination System (NPDES) permit requirements for effluent discharge from the hatchery. Permits are on file in the administrative files at Leavenworth NFH.

**Hazardous Waste:** Leavenworth NFH is currently in compliance with all hazardous waste treatment and control regulations. Efforts have been made to reduce dependence on products resulting in hazardous waste to the greatest extent possible.

**Investigative New Animal Drugs (INAD):** No drugs requiring an Investigative New Animal Drug use permit have been used in recent years. Prophylactic treatments with erythromycin, to combat bacterial kidney disease, have been discontinued pending demonstrated need such as a BKD epizootic. Should erythromycin treatment become necessary, all INAD procedures will be followed.

#### **4.4 Monitoring and Reporting**

**Fisheries Information System:** The FIS is a multifaceted database system consisting of five modules which address unmet management needs (out-year budgeting), accomplishments, deferred maintenance, and other national reporting requirements. This system was previously referenced in “Budgetary Needs and Strategies section. The following paragraphs provide a more detailed description of the modules and their reporting requirements.

**Fisheries Operational Needs System:** FONS was described earlier in this Chapter under “Fish and Wildlife Service Budgeting Process”. This database is available through the hatchery or the Fisheries Program Regional Office in Portland.

**Accomplishment Module:** The Fisheries Accomplishment Module was established as a planning, budgeting, and communication tool to enhance identification of Fisheries Program accomplishments. These data are used in budget documents presented to the Department, OMB, and Congress. The data structure is a "flip-side" of the FONS Module data structure (see previous Fish and Wildlife Service Budgeting Process). This module

is used to describe all accomplishments, regardless of funding source, and is available through the hatchery or the Fisheries Program Regional Office in Portland.

**Fish and Egg Distribution:** This information is used in the Fish and Egg Distribution Report. The report describes the mission of the National Fish Hatchery System, a component of the Fisheries Program of the Fish and Wildlife Service, and its varied accomplishments. The report contains detailed information regarding species, numbers, and pounds of fish produced. It also describes the general purpose of the production program and if it involves listed species. Copies of the report can be obtained by writing the Division of Fish Hatcheries, U. S. Fish and Wildlife Service, 4401 N. Fairfax Drive, Room 810, Arlington, Virginia 22203.

**Imperiled Species Module:** The Imperiled Species Module was designed to capture and report on imperiled species work performed by any Fisheries office. For the purpose of this database, an imperiled species is any species or population that is 1) Federally listed under the ESA as threatened or endangered, 2) petitioned, proposed, or a candidate for Federal listing, or 3) a State-listed or species of special concern. Reporting occurs annually, generally in November.

**Maintenance Management System:** MMS was described earlier in this Chapter under “Fish and Wildlife Service Budgeting Process”. This database is available through the hatchery or the Fisheries Program Regional Office in Portland.

**Station Guides:** The Station Guide provides an overview of the hatchery program and layout. It describes the station location, layout plan, easements or permits in place, water supply, quarters, office and other buildings. The Guide also provides a brief history of the hatchery. This summary document is useful for providing a quick snap-shot to Service employees and parties interested in the hatchery program and facility layout. The Guide is kept current and generally updated annually. Copies can be obtained from the hatchery or the Fisheries Program Regional Office in Portland.

**Real Property Inventory:** The Real Property Inventory (RPI) provides an annual update on Service real property (anything fixed to the ground or a building). The RPI was maintained by the Realty Branch until automated in the spring of 1999. The update function was “pen-and ink changes to a paper file”. This was changed to an automated system using FileMaker Pro software in FY1999. It was converted to a web-based data base in FY2001. This method of updating the database is expected to continue until FY2004 when it will probably be converted to Maximo/SAMMS, also a web-based database.

**Columbia River information System Reports:** This database is used at Columbia River Basin hatcheries to record information related to hatchery operations, marking and tagging, juvenile releases, adult returns, etc. The CRiS also is useful in providing summary reports of this data. The utility and purpose of this database is described in greater detail in Chapter 3 under Monitoring, Evaluation and Coordination.

**Energy Use Report:** This is an annual report that summarizes electricity, heating and cooling energy, and gasoline used at the hatchery.

## References

- Andonaegui, C. 2001. Salmon, steelhead, and bull trout habitat limiting factors for the Wenatchee Basin (Water Resource Inventory Area 45) and Portions of WRIA 40 within Chelan County. Final draft report. WA State Conservation Commission.
- Beamish, R.J. (ed). 1995. Climate Change and Northern Fish Populations. National Research Council of Canada. Ottawa, Canada.
- Cederholm, C.J. et al. 1999. Pacific salmon carcasses: Essential contributions of nutrients and energy for aquatic and terrestrial ecosystems. Fisheries 24 (10): 6-15.
- CCCD (Chelan County Conservation District). 1996. Draft Wenatchee River watershed ranking report addendum, Technical Supplement 1. Wenatchee, WA.
- CCCD 1998. Wenatchee River watershed action plan; a plan containing non-point pollution source control and implementation strategies. Wenatchee, WA.
- Chapman, D., and K. Witty. 1993. Habitat of weak salmon stocks in the Snake River Basin and feasible recovery measures. Report to Bonneville Power Administration, DOE/BP-99654-1. Portland, OR.
- Chapman, D., and C. Peven, T. Hillman, A. Giorgi, and F. Utter. 1994. Status of Summer Steelhead in the Mid-Columbia Region. Don Chapman Consultants Inc. Boise, ID.
- Congleton, J.L., and 10 co-authors. 1995. Evaluation procedures for collection, bypass, and downstream passage of out-migrating salmonids. Draft annual report for 1995, MPE-96-10.
- Economic and Engineering Services, Inc. and Golder Associate, Inc. 1998. Public Utility District No. 1 of Chelan County, Lake Wenatchee groundwater assessment. Wenatchee, WA.
- Elliot, D.G., and R. Pascho. 1994. Juvenile fish transportation: impact of bacterial kidney disease on survival of spring/summer Chinook salmon stocks. 1992. Annual report of the National Biological Survey to the U.S. Army Corps of Engineers, Walla Walla, WA.
- Elliot, D.G., R.J. Pascho, L.M. Jackson, G.M. Mathews, and J.R. Harmon. 1997. *Renibacterium salmoninarum* in spring-summer Chinook salmon smolts at dams on the Columbia and Snake River. Aquat. Animal Health 9: 114-126.
- Emlen, J.M., R.R. Reisenbichler, A.M. McGie, and T.E. Nickelson. 1990. Density-dependence at sea for coho salmon (*Oncorhynchus kisutch*). Can. J. Fish. Aquat. Sci. 47:1765-1772.

- Enhancement Planning Team. 1986. Salmon and steelhead enhancement plan for the Washington and Columbia River conservation area. Vol. 1. Preliminary review draft.
- Goede, R. 1986. Management considerations in stocking of diseased or carrier fish. Pages 349-356 in R.H. Stroud, editor. Fish Culture in fisheries management. American Fisheries Society, Bethesda, MD.
- Groot, C., and L. Margolis. 1991. Pacific salmon life histories. UBC Press, University of British Columbia, Vancouver, B.C.
- Hindes, R. 1994. Watershed characterization and ranking report, Wenatchee River watershed ranking project. Chelan County Conservation District.
- IHOT (Integrated Hatchery Operations Team). 1995. Policy and procedures for Columbia Basin anadromous salmonid hatcheries. Annual report 1994 to the Bonneville Power Administration, Portland Oregon. Project # 92-043. Chapters xx and 5.
- IHOT (Integrated Hatchery Operations Team). 1996. Operation plans for anadromous fish production facilities in the Columbia River Basin, Volume III-Washington. Annual report 1995 to the Bonneville Power Administration, Portland, Oregon. Project 92-043.
- Mantua, N.J., S.R. Hare, Y. Zhang, J.M. Wallace, and R.C. Francis. 1997. A Pacific interdecadal climate oscillation with impacts on salmon production. Bull. Am. Meteorol. Soc. 78: 1069- 1079.
- McNeil, W.J. and D.C. Himsworth. 1980. Salmonid ecosystems of the North Pacific. Oregon State University Press and Oregon State University Sea Grant College Program, Corvallis, Oregon.
- Montgomery Water Group, Adolfson Associates, Hong West and Associates, R2 Resource Consultants, Marshall and Associates, and Washington Department of Ecology. 1995. Draft Initial Watershed Assessment Water Resources Inventory Area 45, Wenatchee River Watershed. Open file report 95-12. Kirkland, WA.
- Mullan, J.W., K.R. Williams, G. Rhodus, T.W. Hillman, and J.D. McIntyre. 1992. Production and habitat of salmonids in mid-Columbia River tributary streams. Monograph I, USFWS, Leavenworth, WA.
- Nielsen, C.J., 1940. The Snow Lake Tunnel: Migratory Fish Control, Columbia Basin Project, *The Reclamation Era*, March 1940: 72-76.

- NMFS (National Marine Fisheries Service). 1999a. Biological Assessment for Mitchell Act Hatchery Operations. Hatcheries and Inland Fisheries Branch, Portland, Oregon.
- NMFS (National Marine Fisheries Service). 1999b. Biological Opinion on Artificial Propagation in the Columbia River Basin, Endangered Species Act - Section 7 Consultation.
- NMFS (National Marine Fisheries Service). 1999c. Biological Opinion on Harvest in the Columbia River Basin, Endangered Species Act - Section 7 Consultation.
- NMFS (National Marine Fisheries Service). 2001. Biological Opinion on Artificial Propagation in the Upper Columbia River Basin. NMFS, Northwest Region.
- Peven, C.M. 1990. The life history of naturally produced steelhead trout from the mid-Columbia River Basin. M.S. thesis. University of Washington, Seattle, WA.
- SIWG (Species Interactions Work Group). 1984. Evaluation of potential interaction effects in the planning and selection of salmonid enhancement projects. Report prepared for the Enhancement Planning Team for the implementation of the Salmon and Steelhead Conservation and Enhancement Act of 1980. Washington Department of Fish and Wildlife. Olympia, WA.
- Salonius, K., and G.K. Iwama. 1993. Effects of Early Rearing Environment on Stress Response, Immune Function, and Disease Resistance in Juvenile Coho (*Oncorhynchus kisutch*) and Chinook Salmon (*O. tshawytscha*). Canadian Journal of Fisheries and Aquatic Sciences 50: 759-766.
- Schreck, C.B., A.G. Maule and S.L. Kaattari. 1993. Stress and disease resistance, p. 170-175. In J.F. Muir and R.J. Roberts [ed.] Recent Advances in Aquaculture, Vol. 4. Blackwell Scientific Publications, Oxford, UK.
- Steward, R., and T. Bjornn. 1990. Supplementation of salmon and steelhead stocks with hatchery fish: a synthesis of published literature. Tech. Report 90-1. Part 2 in W.H. Miller, editor. Analysis of Salmon and Steelhead Supplementation. BPA, Portland, OR. USFWS, Dworshak Fisheries Assistance Office, ID.
- SURPH. 2004. School of Aquatic and Fishery Sciences, University of Washington, Seattle, WA. [www.cqs.washington.edu/paramest/SURPH/](http://www.cqs.washington.edu/paramest/SURPH/)
- USFWS (U.S. Fish and Wildlife Service). 1993. Hatchery Evaluation Vision Action Plan. Draft planning report, May 14, 1993 by Region 1 Fisheries, Portland, OR.
- USFWS (U.S. Fish and Wildlife Service). 1999. Hatchery and Genetic Management Plan, spring Chinook salmon, Spring Creek National Fish Hatchery, October 2002. Columbia River Fisheries Program Office, Vancouver, Washington.

USFS (U.S. Forest Service). 1994. Icicle Creek stream survey report by: Jones, Gower, and Rickel. Wenatchee National Forest, Leavenworth Ranger District.

USFS (U.S. Forest Service). 1995. Icicle Creek Watershed- Watershed Assessment. USDA Forest Service, Wenatchee National Forest, Leavenworth Ranger District.

Washington State Conservation Commission. 1999. Salmon and steelhead habitat limiting factors in Water Resource Inventory Area (WRIA) 29.

WDF/WDW (Washington Department of Fish and Washington Department of Wildlife). 1993. 1992 Washington State salmon and steelhead stock inventory; Appendix Three, Columbia River stocks. Olympia, WA.

WDFW (Washington Department of Fish and Wildlife) 2001. Wenatchee River Subbasin Summary (Draft). Prepared for the Northwest Power Planning Council, Portland, OR.

## **Explanation of Purpose**

### **Leavenworth National Fish Hatchery – Comprehensive Hatchery Management Plan**

This Comprehensive Hatchery Management Plan (CHMP) for Leavenworth National Fish Hatchery (NFH) is an operational management plan which outlines policy, legal mandates, goals and objectives relevant to the overall management of the station. This document is a planning and reference tool and is not a decision-making or policy-making document.

Additional documents developed as separate processes are referenced in this CHMP and provide biological, policy, legal, and management analysis of Leavenworth NFH. These documents are the Biological Assessment and Biological Opinion on Artificial Production in the Columbia River Basin, the Federal Columbia River Power System Biological Opinion, the Hatchery and Genetic Management Plan, and the U.S. v Oregon Columbia River Fisheries Management Plan.

The correct citation for this plan is:

U.S. Fish and Wildlife Service (USFWS). 2004. Comprehensive Hatchery Management Plan for the Leavenworth National Fish Hatchery. Planning Report Number 2, U.S. Fish and Wildlife Service, Leavenworth National Fish Hatchery, Leavenworth, Washington.



This Comprehensive Hatchery Management Plan for Leavenworth National Fish Hatchery (Planning Report: Number ?) addresses the Pacific Region’s requirement to integrate U.S. Fish and Wildlife Service objectives and priorities with those of co-managers, other agencies, and resource programs; fulfill obligations under the Endangered Species Act and relevant fisheries conservation, mitigation, and management programs; identify and define, in specifics, what hatchery reforms are implemented to achieve objectives; and, provide a foundation for future program and budget development and review.

Submitted by: \_\_\_\_\_  
Project Leader, Leavenworth NFH Date

\_\_\_\_\_  
Project Leader, Mid-Columbia River FRO Date

\_\_\_\_\_  
Project Leader, Olympia Fish Health Center Date

Approved: \_\_\_\_\_  
Assistant Regional Director, Fisheries Date

Approved: \_\_\_\_\_  
Regional Director, Pacific Region Date

## **Acknowledgments**

Dan Diggs and Doug DeHart coordinated the initial development of this plan, along with Chuck Dunn, Lee Hillwig, Ed Forner, Kate Benkert, Bob Semple, Larry Marchant, Ed Lamotte, Bob Wunderlich, Ron Wong, Ray Jones, Thomas Trock, Brian Cates, and Rich Johnson.

### **List of Attachments**

- Attachment 1. Map of USFWS Pacific Region (Region 1), Fish Facilities.
- Attachment 2. Historical Background of Region 1 Hatcheries.
- Attachment 3. Statutory Mandates and Authorities.
- Attachment 4. Map of Wenatchee River Watershed, Land Ownership.
- Attachment 5. Hatchery Buildings, Primary Use and Improvements.
- Attachment 6. Leavenworth NFH Physical Description of Holding, Incubation, and Rearing Units.
- Attachment 7. Layout Diagram of Leavenworth NFH.
- Attachment 8. Map of Wenatchee River Basin, Fish Structures and Facilities.
- Attachment 9. Listed and Candidate Species in Vicinity of Leavenworth NFH.
- Attachment 10. Fish Species Present in the Wenatchee River Basin.
- Attachment 11. Historical Fish Releases from Leavenworth NFH, 1941-2003.
- Attachment 12. USFWS/WDFW Fish Health Guidance Letter (5/1/02).
- Attachment 13. Brood Year Survival/History, 1979-1998.
- Attachment 14. Coded-Wire Tag Recoveries, 1999-2001. Contribution to Fisheries, 1991-2000.
- Attachment 15. Current Budget and number of personnel.
- Attachment 16. Regional and National Budget Formulation.
- Attachment 17. Guidance from Regional Director for distribution of surplus fish.
- Attachment 18. Memo from RD concerning use of anesthetics, etc.
- Attachment 19. Integrated Pest Management Plan.